The Journal of Nervous and Mental Disease

Vol. 123, No. 1 JANUARY 1956 Serial No. 889

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The Journal of Nervous and Mental Disease

Vol. 123, No. 1 JANUARY 1956 Serial No. 889

THE EFFECTS OF RESERPINE (SERPASIL®) ON THE CHRONIC DISTURBED SCHIZOPHRENIC: A COMPARATIVE STUDY OF RAUWOLFIA ALKALOIDS AND ELECTROCONVULSIVE THERAPY

D. NAIDOO, B.Sc., Ph.D., M.B., B.S., M.R.C.P., D.P.M.

A great deal of interest has recently been shown in the alkaloids of Rauwolfia serpentina. Several encouraging reports have already appeared.[28, 21, 8, 10, 11, 14] Also, two conferences on reserpine, held by the Section of Biology of the New York Academy of Sciences in February of 1954 and 1955, have surveyed most of our present knowledge on the subject.

Neuropsychiatric interest in the applications of the drug goes back to the antiquity of medical history. However, only after recent chemical isolation of the active alkaloid reserpine[13] and subsequent pharmacological study[24, 15, 25, 17, 26, 5, 18, 4] has well ordered clinical investigation been possible.

The crude root from which the alkaloid is derived appears never to have been accepted as a medicament of repute by ancient physicians who were aware of it, although it seems to have been used in several remedies for a large number of diseases, including "maniacal forms of insanity." Rauwolfia serpentina appears, however, in the *Pharmacographica Indica of 1889–93* as well as the *British Pharmaceutical Codex (1949)*.

Early modern references to the use of the crude root were made in 1931, when Sen and Bose noted its efficacy in maniacal states.[20] Later, Roy presented experimental evidence for its hypnotic action.[16] Siddiqui and Siddiqui reported its "curative properties" in insanity.[22] Chopra and Gupta emphasized its value as a sedative and pointed out the practice of some Hindu peasantry of putting children to sleep with powdered Rauwolfia root.[2] Ten years later, Deb referred to its increasing popularity in India for the treatment of mental disease by private physicians.[3] This author reported clinical improvement in "manic depressive, schizophrenic, and addictive illnesses." Roy, on the other hand, pointed out that the motor symptoms, rather than the mental, had improved in his cases.[16]

More recently, intensive work on the hypotensive properties of the alkaloid have been investigated by Indian and American workers, and it is reported in many of these papers that there was a reduction of nervous tension and that the sedative or tranquilizing effects of the drug were prominent. Hakim's report of the striking successes achieved with the combination of drugs indigenous to India drew a great deal of lay interest, but his preparation contained several other powders as well as rauwolfia.[6]

As Nathan Kline has pointed out,[11] owing to the "tremendous paucity of pharmacological methods in treating mental disease," these early reports aroused great interest, and he therefore conducted the first study of both the crude root and the alkaloid in 411 patients. Kline reported that his patients with "marked anxiety reactions" became relaxed and comfortable.[11] There was a feeling of well-being, a greater feeling of optimism, and a tendency to a greater degree of sociability. The patients seemed to be more outgoing, less reserved, and less inhibited. Secondly, circumstances which ordinarily produced anxiety or depression in the patient did not affect him. In several male patients who were extremely restless and tense with a marked degree of hypermobility, a relaxing and tranquilizing effect of the drug was noticed.

Noce, Williams, and Rapaport reported remarkable changes that occurred in the atti-

tudes and behavior of patients who had received oral and parenteral doses of Serpasil.[14] These authors treated seventy-four mentally ill patients (68 female and six male) and thirteen mental defectives. They selected cases with a negative prognosis who had been ill for very long periods and had been refractory to other methods of treatment, including electroconvulsive therapy. They noted that whereas the wards had been in continuous turmoil because of "raucous, hyperactive, combative, resistive and uncooperative patients," the administration of Serpasil altered the behavior of the patients so much that they were friendly, cheerful, sociable, and quiet. In addition, they stated that seclusion, sedation, restraint, and electroconvulsive therapy were eliminated in most patients and that ward workers were "overjoyed with the prospect of being converted from custodians to rehabilitation therapists."

Weber,[27] reporting a clinical trial on twenty-two chronic psychotics, states that considerable improvement was observed in seven of his cases. The changes he noted were similar to those seen by Barsa and Kline.[1] More recently, Hollister *et al.* treated 127 chronic schizophrenics for a period of one to eight months.[7] The majority of these patients had been ill for nine years or more. In this series, 98 cases showed significant improvement; in 58, improvement was moderate to marked.

Tasher and Chermak, reporting a study of 225 chronic patients, state that 100 of these cases were patients requiring one or two electroconvulsive treatments per week for periods ranging from several months to years in order to control chronic irritable, assaultive, and destructive behavior or because of a tendency to relapse into severely withdrawn states.[23] In all these 100 cases it was possible to discontinue electroconvulsive treatment after the initiation of Serpasil therapy.

Kirkpatrick and Sanders found significant improvement in their 210 patients of all types and in some cases state that their results were startling.[9]

The Problem

The disturbed schizophrenic of long standing is undoubtedly a major management problem in mental hospitals. In these patients the use of electroconvulsions, seclusion, restraints, sedation, and other forms of treatment consumes a large proportion of medical and nursing time which could otherwise be directed toward positve therapeutic measures.

Repeated electroconvulsive therapy is not without its hazards in long-standing cases. Increased incidence of fractures in the fragile skeleton of advancing age, muscular injuries, the breakdown of old tuberculosis, cardiovascular catastrophes, and the onset of a progressive cerebral gliosis are some of the undesirable possibilities of electroconvulsive therapy. Further, the cost to the state exchequer of this category of patient is always disproportionately high. Therefore, a drug with very few side effects which can be taken by mouth offers a substantial advantage should its therapeutic properties prove equal or superior to those of electroconvulsive treatment.

In view of the importance of the psychiatric and economic problems involved, it was decided to carry out therapeutic trials. This communication describes and graphically illustrates the results of work on eighty disturbed chronic schizophrenics forming a homogeneous clinical group, housed in a single ward block and attended by the same medical and nursing staff.

Materials and Methods

Clinical Material

A large block of wards housing over 200 disturbed patients at Fairfield State Hospital was chosen as the site of study. Eighty patients, all chronic schizophrenics requiring various methods of treatment designed to render them more amenable to hospital management, were chosen. Every patient was disturbed enough to require either special measures or excessive medical nursing attention or both. They were examined for physical illness to exclude serious hypertension, gastrointestinal disease, and severe arteriosclerosis. Only five cases which had been leucotomized were included. Mental defectives were excluded. (See table 1.)

This homogeneous group of 80 "difficult" cases was then divided into four groups of 20 each at random. Groups were then checked by an observer other than the investigator and found to match. They were labelled A, B, C, and D. At the beginning of treatment Group A received a placebo. Group B received Ser-

TABLE 1.—TABULATED DETAILS OF THE 80 CASES SELECTED

Case	Age	Length of Hospitalization/ Duration of Illness in Years	No. of E.C.T.	Other Treatment	Description	Score
A-1 M.A.	62	44/44	18	—	Depressed, destructive, irritable, untidy, denudative	++
A-2 M.A.	60	21/30	—	—	Assaultive, mute, untidy, denudative	++
A-3 M.B.	51	15/17	94	—	Assaultive, destructive, impulsive, untidy	++
A-4 G.B.	28	10/12	100	—	Bizarre activity, destructive, assaultive, overactive, sex acts (open), denudative	++
A-5 G.C.	70	18/19	10	Amniotin, 1937	Bizarre activity, deluded, overactive, overtalkative	++
A-6 M.C.	45	18/23	37	—	Assaultive, destructive, irritable, untidy, denudative	++
A-7 S.C.	38	14/14	646	Lobotomy, 1946	Assaultive, anxious, deluded, impulsive, untidy	++
A-8 D.D.	48	21/21	8	—	Assaultive, destructive, refuses food, impulsive, untidy, denudative	++
A-9 H.G.	29	11/11	59	—	Assaultive, bizarre activity, deluded, irritable, sex acts (open)	++
A-10 K.G.	39	14/17	7	—	Assaultive, refuses food, irritable, untidy	++
A-11 I.J.	59	9/10	106	—	Assaultive, bizarre activity, destructive, impulsive, irritable	++
A-12 I.L.	54	22/23	?	—	Assaultive, bizarre activity, deluded, impulsive	++
A-13 H.M.	41	16/18	55	—	Assaultive, destructive, refuses food, impulsive, untidy, denudative	++
A-14 M.M.	32	10/12	12	—	Deluded, depressed, refuses food, hallucinates, irritable	++
A-15 H.O.	50	17/19	197	—	Anxious, deluded, hallucinates, hypochondriacal, impulsive, assaultive	++
A-16 R.P.	57	34/34	43	—	Assaultive, deluded, destructive, impulsive, untidy, denudative	++
A-17 R.S.	53	23/25	27	—	Deluded, impulsive, irritable, overtalkative, interfering	++
A-18 R.S.	57	23/23	92	—	Assaultive, destructive, impulsive, irritable, untidy	++
A-19 G.W.	52	20/20	8	—	Destructive, refuses food, hallucinates, untidy, denudative	++
A-20 M.Y.	43	17/12	63	—	Assaultive, destructive, refuses food, impulsive	++
B-1 J.A.	56	25/38	111	—	Bizarre activity, hallucinates, overtalkative, untidy	++
B-2 B.A.	55	17/25	—	—	Assaultive, deluded, hallucinates, impulsive, irritable, hypochondriacal	++
B-3 C.B.	41	7/13	10	—	Bizarre activity, deluded, destructive, hallucinates, untidy, denudative	++
B-4 M.C.	20	3/6	105	Insulin	Assaultive, impulsive, irritable, overactive, sex acts (open)	++
B-5 M.C.	36	13/14	19	—	Assaultive, deluded, destructive, hallucinates, untidy	++
B-6 O.C.	64	30/36	—	—	Deluded, destructive, refuses food, impulsive, untidy, denudative	++
B-7 M.C.	57	24/26	—	—	Deluded, destructive, impulsive, irritable, insomnia	++
B-8 E.D.	50	26/27	64	—	Assaultive, deluded, destructive, refuses food, untidy	++
B-9 B.E.	31	3/4	135	Insulin	Anxious, deluded, destructive, refuses food, irritable, assaultive	++
B-10 L.J.	74	25/27	14	—	Destructive, irritable, overactive, overtalkative, untidy	++
B-11 E.L.	53	24/26	20	Metrazole	Bizarre activity, deluded, destructive, hallucinates, assaultive	++

TABLE 1.—Continued

Case	Age	Length of Hospitalization/ Duration of Illness in Years	No. of E.C.T.	Other Treatment	Description	Score
B-12 E.L.	44	7/9	110	Lobotomy, 1947	Assaultive, depressed, destructive, irritable, insomnia	++
B-13 A.M.	62	39/43	27	—	Deluded, destructive, hallucinates, untidy, insomnia	++
B-14 J.O.	42	13/16	276	—	Assaultive, destructive, irritable, untidy, insomnia, denudative	++
B-15 E.P.	68	26/27	18	—	Anxious, hypochondriacal, irritable, overtalkative, insomnia	++
B-16 M.R.	47	18/20	—	—	Assaultive, bizarre activity, deluded, hallucinates	++
B-17 M.R.	44	16/16	47	Metrazole	Assaultive, destructive, refuses food, retarded activity, untidy, denudative	++
B-18 B.S.	50	15/16	33	Lobotomy, 1946	Deluded, destructive, impulsive, irritable, overtalkative, assaultive	++
B-19 M.P.	55	22/33	10	—	Destructive, hallucinates, impulsive, untidy, assaultive	++
B-20 C.W.	31	11/18	10	Insulin	Assaultive, deluded, destructive, untidy, insomnia, depilatory	++
C-1 R.A.	44	17/24	10	—	Destructive, refuses food, impulsive, untidy	++
C-2 F.A.	46	19/21	364	Insulin, metrazole	Assaultive, destructive, refuses food, irritable, untidy, denudative	++
C-3 E.A.	45	15/15	194	—	Assaultive, deluded, destructive, impulsive, insomnia	++
C-4 S.B.	62	20/23	30	—	Anxious, bizarre activity, destructive, refuses food, overtalkative	++
C-5 H.B.	54	8/9	57	—	Anxious, depressed, refuses food, homicidal	++
C-6 B.C.	36	10/15	292	—	Assaultive, deluded, impulsive, irritable, sex acts (open)	++
C-7 S.D.	35	15/15	124	Lobotomy, 1947	Deluded, impulsive, irritable, untidy, insomnia	++
C-8 C.D.	40	16/22	41	—	Deluded, destructive, refuses food, impulsive, untidy, denudative	++
C-9 L.D.	49	14/14	55	Metrazole	Assaultive, deluded, hallucinates, impulsive,	++
C-10 J.G.	37	12/12	195	—	Assaultive, deluded, impulsive, insomnia, anorectic, denudative	++
C-11 M.J.	33	9/9	390	—	Deluded, destructive, impulsive, irritable, assaultive	++
C-12 M.J.	38	3/4	212	—	Assaultive, deluded, destructive, anorectic, impulsive	++
C-13 M.J.	17	2/2	231	—	Anxious, deluded, hypochondriacal, impulsive, irritable, assaultive	++
C-14 M.O.	43	24/24	85	—	Assaultive, destructive, sex acts (open), untidy, insomnia	++
C-15 N.P.	35	16/17	286	—	Assaultive, bizarre activity, destructive, untidy, denudative	++
C-16 D.P.	39	11/17	175	—	Assaultive, deluded, hallucinates, impulsive, insomnia	++
C-17 M.S.	42	7/18	141	—	Assaultive, deluded, destructive, anorectic, overtalkative	++
C-18 C.S.	37	20/21	209	Insulin	Assaultive, deluded, destructive, impulsive, anorectic	++
C-19 J.W.	46	14/16	33	—	Assaultive, deluded, destructive, impulsive, denudative, hallucinates	++
C-20 E.Z.	35	10/13	194	—	Assaultive, destructive, hallucinates overtalkative, untidy, denudative	++
D-1 H.A.	35	10/25	167	—	Assaultive, destructive, impulsive, untidy, irritable, unpredictable	++
D-2 P.A.	52	18/22	78	—	Anxious, bizarre activity, deluded, depressed, hypochondriacal	++

TABLE 1.—Continued

Case	Age	Length of Hospitalization/ Duration of Illness in Years	No. of E.C.T.	Other Treatment	Description	Score
D-3 A.B.	36	10/14	405	—	Assaultive, bizarre activity, destructive, impulsive, overactive	++
D-4 E.B.	38	17/18	162	Metrazole	Destructive, loss of interest, mute, retarded activity, untidy	++
D-5 M.C.	35	6/15	225	—	Assaultive, deluded, hallucinates, impulsive, suicidal	++
D-6 E.D.	24	4/5	360	—	Assaultive, deluded, hallucinates, hypochondriacal, irritable, bites	++
D-7 S.D.	33	10/10	344	—	Destructive, euphoric, hallucinates, impulsive, untidy, denudative, depilatory	++
D-8 E.D.	40	11/12	29	—	Deluded, destructive, hallucinates, obsessive, overtalkative	++
D-9 M.G.	36	16/16	34	—	Assaultive, deluded, destructive, hallucinates, overtalkative	++
D-10 C.G.	48	13/15	206	—	Destructive, anorectic, mute, untidy, denudative, depilatory	++
D-11 G.H.	38	7/13	165	Insulin	Anxious, deluded, depressed, hallucinates	++
D-12 C.M.	28	4/5	211	Insulin	Assaultive, deluded, impulsive, sex acts (open)	++
D-13 P.M.	45	15/19	227	Insulin, metrazole; lobotomy, 1946	Bizarre activity, deluded, destructive, irritable, assaultive	++ ++
D-14 N.P.	40	4/4	35	—	Anxious, deluded, hallucinates, impulsive, assaultive	++
D-15 E.P.	43	12/13	369	—	Assaultive, deluded, impulsive	++
D-16 M.P.	35	13/19	194	—	Assaultive, bizarre speech, hypochondriacal, impulsive	++
D-17 M.R.	36	7/13	376	Insulin	Assaultive, anxious, bizarre speech, deluded, destructive, bites	++
D-18 D.S.	40	24/24	12	Metrazole	Assaultive, destructive, sex acts (open) untidy, insomnia	++
D-19 A.W.	42	6/?10	23	—	Assaultive, deluded, refuses food, hallucinates, impulsive	++
D-20 M.Z.	58	7/37	75	—	Bizarre activity, overtalkative, deluded, overactive, interfering	++

pasil. Group C received a placebo plus electroconvulsive therapy. Group D received both Serpasil and electroconvulsive therapy.

Preparation of placebos. A saline placebo colored with a small amount of riboflavin to resemble exactly the injectable Serpasil was prepared by introducing 0.1 ml. of injectable vitamin into a sealed sterile container of normal saline. Placebo tablets identical in appearance to the active tablet were obtained for oral medication.

Treatment first week. Serpasil, 2.5 mg. in 1.0 ml. of fluid, was injected intramuscularly twice daily, morning and evening, twelve hours apart, into forty patients constituting Groups B and D. At the same time, 1.0 ml. of saline placebo was injected into forty patients comprising Groups A and C.

Treatment second week. Crushed tablets were given to all patients cooperative enough to take oral medication. Five tablets containing a total of 5.0 mg. of active alkaloid were crushed in a mortar and mixed with honey. Five similar placebo tablets were prepared in the same way. This confection was then administered night and morning for a total of 10 mg. a day in place of the intramuscular injection in all patients who were able to take it by mouth. In persistently resistive and assaultive patients intramuscular injection of 2.5 mg. of Serpasil twice daily was continued until they were able to take the medication

by mouth. In each case, however, oral medication was offered the patient first and the injection given only when the attendant nurse was unsuccessful.

Treatment third and fourth weeks. Placebos or 5.0 mg. of reserpine, depending on the group was given orally b.i.d. When the patient appeared to be losing any ground gained during the previous weeks, she received a "boosting dose" of 5.0 mg. intramuscularly in addition to the usual 10.0 mg. a day by mouth.

Treatment fifth to eleventh week. The alkaloid or the placebo was continued in the same dosage. However, during this time the dose was adjusted according to physiological response. The dose given was just short of that required to produce a mild tremulousness. It must be emphasized that at this stage the dosage was entirely determined by its effects upon the patient, as will be discussed later.

Treatment twelfth and subsequent weeks. At the commencement of the twelfth week the groups previously used as controls were also given the active drug. Thus, after the eleventh week both Groups A and B were given Serpasil, and Groups C and D received reserpine and electroshock. This was done by switching the placebo tablet for the identical but active Serpasil tablet in the expectation that Groups A and C, which acted as controls for the first eleven weeks, would now improve in a similar way as did Groups B and D.

The therapeutic regimen employed when the control patients were switched to the active drug followed an adaptation of the methods advised by Kline and Barsa,[1] involving one injection of 5.0 mg. a day in the morning with concurrent oral medication of 5.0 mg. morning and evening. Thus, each of these patients received a total of 15.0 mg. per day. Injections were discontinued after seven days and the oral dose adjusted to the requirements of the individual patients. Groups B and D continued to receive the doses on which they appeared to be stabilized in the eleventh week.

Electroconvulsive therapy. Groups C and D were given weekly convulsions during the first six weeks and thereafter received one treatment at fortnightly intervals. From the twelfth week Group C, which was then transferred from placebo to Serpasil, received weekly treatments, thereby repeating the procedure applied to Group D in the first weeks of the investigation.

MEDICAL EVALUATION

Appendix 1.

Project 1. Hospital Record No.

Case No. _____ Name _____ Sex _____ Age _____

Clinical Summary:

Diagnosis:

Reason for ECT at present: Present Treatment:

Other Treatment:

1. Leucotomy 2. Insulin 3. ECT 4. Other

GENERAL DATA

PROGRESS INTERVIEWS		Before	After
Score ++, +, +-, -, - -	Weight		
Interviews . 1 2 3 4 5 6 7 8 9 10 11 12	B. P.		
1	C. N. S.		
2	C. V. S.		
3	Alim.		
4	G. U.		
5	Menstrual		
6	Skin Te.		
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Group			
A			
B			
C			
D			
FIRST IMPRESSION FINAL IMPRESSION			
	Evaluation of Data Overhead		

WEEKS

FIG. 1

NURSING EVALUATION

Appendix 2

Patient: Name _____ No. _____

Age _____ Group _____

Sex _____

NURSING DATA: -- Please record how much attention this patient has required week by week.

If excessive record ++
If considerable record +
If no more or less than is usual record +-
If less record -
If markedly reduced record - -

Week		Any Comment	Week		Any Comment
1			12		
2			13		
3			14		
4			15		
5			16		
6			17		
7			18		
8			19		
9			20		
10			21		
11					

FIG. 2

NURSING EVALUATION

Appendix 3

Name: _____ Group: _____ No.: _____

SYMPTOM	RATING											
Assaultiveness												
Anxiety												
Bizarre activity												
Bizarre speech												
Delusions												
Depression												
Destructiveness												
Euphoria												
Food Refusal												
Hallucinations												
Hypochondriasis												
Impulsiveness												
Irritability												
Loss of Interest												
Mutism												
Obsessive symptoms												
Overactivity												
Overtalkative												
Retarded activity												
Suicidal attempts												
Sex acts - open												
Untidiness												
Incidence of Seclusion												
Incidence of Sedation												
Incidence of Restraint												

FIG. 3

Method of Evaluation

The problem of amenability to nursing care and psychiatric assessment were separated so that two sets of comparative evaluations were undertaken on the same patients during the course of the study—one by the nursing staff and one by the medical staff. A five-point ranking score was used in both instances. (See figs. 1, 2, and 3.) The designation plus-plus was used on the nursing score sheets to represent a very difficult patient, one very likely to be assaultive, destructive, and dirty. On the medical score sheets, plus-plus meant a severely disturbed schizophrenic. At the other end of the scale, the designation minus-minus represented a completely amenable patient on the nursing score and a markedly improved patient on the medical sheets. The range of the score was minus-minus, minus, plus-minus, plus, plus-plus. Figures 1, 2, and 3 show the score sheets used in keeping medical and nursing records and the detail record of symptomatic improvement.

In order that bias should be excluded as far as possible from the study, neither the medical nor the nursing staff was told the design of the investigation. The placebo was labeled Reserpine "A" and the active alkaloid Reserpine "B," so that it was thought that two types of reserpine were being used to treat patients as part of an ordinary therapeutic program. The physicians knew only that a control study was being carried out.

Nursing evaluations were made by the senior nurse and her assistants in consultation, with the medical worker in attendance. Medical evaluations during the first eight weeks were made at weekly intervals. A physician with personal knowledge of the cases for long periods but who had no information whatever about the group to which each patient belonged was available to give neutral opinion on the clinical changes. In subsequent months, fortnightly intervals elapsed between the interviews.

At each interview the patient was seen in an office for as long as was necessary to form an opinion. The senior nurse was always in attendance at these medical interviews. However, the medical observer was not offered any information and formed an opinion on the interview alone. This opinion and the author's evaluation were immediately set down as soon as the patient left the room. In both instances the opinion was expressed numerically by designating each patient from minus-minus to plus-plus.

RESULTS

Group A (Placebo)

During the first week an increased degree of cooperation was noticed in all but the most disturbed cases. Some patients came up to the medication cart for their injections without being assisted by attendants and others appeared less resistive than expected. However, the incidence of seclusion and sedation was not materially altered and substantially the same number of patients were considered suitable for and continued to receive hydrotherapy and cold packs.

Group B (Serpasil alone)

The changes seen in this group of patients were distinctly unlike those enumerated above. During the evening of the first day and on the day following the first injection, there was a marked calming effect upon motor activity. The hyperactive and noisy patients were less active and less noisy. The skin in the fair-

complexioned patients was seen to be markedly flushed. The effect of the drug could be observed in the injected conjunctivae and constricted pupils of patients of all complexions. The majority had nasal congestion and some had periorbital edema. Some patients suffered sharp bouts of diarrhea, and those who were able complained of epigastric pain, which was quickly relieved by milk. Their movements became slow, and several patients, previously active and rowdy, sat quietly and some would move only reluctantly. The tenseness which had characterized the facies of certain patients and their agitated demeanor were no longer seen to the same degree. Some cases formerly openly aggressive and assaultive were assaultive only when irritated by other patients or by nursing attention.

Observation of this group for several hours continuously on the fourth day of treatment showed that many had swings of mood of remarkable rapidity; for as long as half an hour at a time some patients showed strikingly increased rapport, only to lapse again to their usual mental state. The torpor and lability of mood gave way by the seventh day to a euphoria which increased with the lessening of torpor.

The rate at which these changes became apparent varied from individual to individual. At the end of the first week five patients of Group B showed no changes other than the flushing of the skin and injection of the conjunctivae. During the subsequent week these five patients showed some of the changes observed in the other fifteen during the first week, but at no time did they show the calmness and the slowing of motor activity seen in the others. By the end of the third week, three cases showed remarkable clinical improvement and five remained completely unchanged. The others showed intermediate degrees of improvement.

The average numerical score for Group B was plus 14 on the fifteenth day of treatment and minus 10 at the end of the study. (See fig. 4.) The major fall from plus 40 to plus 14 was accomplished in the first two weeks.

During the third and fourth weeks, the majority of patients were salivating excessively and a few were drooling. This was followed by the faces of two patients becoming expressionless and their gait festinating. They showed a fine tremor and appeared to be approaching a pseudo-Parkinsonian state. This condition was reversed by reducing the dose by one-third.

At the end of the fifth week assaultiveness and destructiveness were considerably reduced, the patients were cleaner, and some began to take a new-found pride in their appearance. Several cooperated in small ward tasks and many remembered to observe the little courtesies of life. From this point on, no new changes were seen. One fourth of the cases were unresponsive to treatment and showed no alteration.

The most improved one-fourth held their gains very well, whereas there was some fluctuation in the condition of the intermediate half. A few of these "intermediate patients" showed as much change as the best cases but were given a lower score because of occasional lapses. Others at the lower end of the scale were little better than the unimproved cases but were given a higher score on account of periods of increasing rapport and cooperation. These intermediate cases, comprising half the patients in the group, represented, on the whole, an appreciable clinical change. This degree of change proved to be of benefit to their management. The wards were kept cleaner and the atmosphere was quieter. The amount of soiled linen sent to the laundry and the number of torn garments were substantially reduced. After the ninth week, patients of Group B and those in Group D were similar in nearly all respects, and the description under Group D applies to both groups.

Group C (Placebo plus Electroconvulsive Therapy)

This group of twenty cases showed only slightly greater amenability than Group A treated with placebos. However, whereas Group A reverted to their original difficulties by the end of the sixth week, Group C, treated with electroshock plus placebo, maintained the initial improvement and at the end of the tenth week scored plus 28 as against plus 38 for Group A.

Group D (Serpasil plus Electroconvulsive Therapy)

The changes observed in Group B cases, treated with Serpasil alone, were also to be seen in Group D. However, in this latter group

the improvement was of slightly greater degree and much more rapid in onset. The amenability curve dropped sharply in the first week to zero from 40 plus and remained consistently below zero through the course of the study.

In the clinical evaluations Group D also was given a better score than Group B. Several patients showed a remarkable improvement in their rapport and were able to carry on prolonged conversations which were consistent and rational as to subject matter. The greatest improvement occurred in the first two weeks of treatment, as was observed in Group B, treated with Serpasil alone. Incidence of side effects was no greater in Group D than in Group B. However, during electroconvulsive therapy, increased bronchial secretion and hypersalivation were found to be mildly troublesome, since the mouths of some patients would become filled with saliva and mucoid secretion during the convulsion. In this group the slow recovery of normal respiration was a marked feature, although only one case of moderately prolonged apnea was observed. The voltage and duration of the current administered were reduced to the minimum possible required to produce a convulsion. During the second week a considerable reduction of current was possible.

During subsequent weeks the difficulty with respiration during shock treatment diminished. However, lower voltage and shorter periods of time were employed than previously. The progress of Group D approximately paralleled the improvement made by Group B on the third week. The side effects seen and the proportion of cases markedly improved as against those who were unimproved were similar. The intermediate group comprised 50 per cent of cases and also showed various degrees of response to treatment.

At the commencement of the eighth week all 80 patients were removed to one floor and then an intensive rehabilitory program was instituted, adjusting the amount and type of work to the degree of amenability of small groups of patients, irrespective of their experimental grouping. The results of this procedure showed that patients almost exclusively from Groups B and D were to be found in the therapeutic activity groups, showing that they were very much more amenable, cooperative, and interested, whereas patients from Groups A and C (A received placebo; C received shock and placebo) did not respond favorably. The scores of Groups B and D (B received Serpasil; D received Serpasil and shock) improved during this phase, but those of A and C changed only slightly.

Groups A and C (Twelfth and Subsequent Weeks)

At the beginning of the twelfth week, when each of the four groups had maintained a steady level of behavior for approximately six weeks, the control groups, A and C, were switched to the active alkaloid by substituting the active solution and tablets for placebos, which looked identical in all respects. So far as all the personnel, medical and otherwise, were concerned, the patients were still receiving "Serpasil," half with electroconvulsions and half without.

In order that prejudice should not enter into the later evaluations and in order to compare two dosage schemes, it was considered desirable to give them an injection only in the morning and to administer tablets instead of the evening intramuscular injection of 2.5 mg. of Serpasil, as had been the case when starting Groups B and D. After the switch, Groups A and C were given one injection of 5.0 mg. and two oral doses of 5.0 mg., one at night and one in the morning. These groups, therefore, were given a larger initial dosage (15.0 mg. a day) than Groups B and D, which had received parenterally individual doses (5.0 mg. the first week).

The intramuscular injection was eliminated at the end of the first week and subsequently used only as a boosting procedure. After the switch to reserpine, the results obtained in Groups A and C were similar to those that had been seen in B and D, but the improvement was not so rapid. These patients were extremely lethargic, confused, flushed, and some had facial and ankle edema. Others complained of severe headaches and deep pains in their limbs. There was very noticeable improvement in amenability in the first week, but not as much as was seen in the first patients (Groups B and D) treated with the alkaloid. During the second week of active drug administration the patients in Groups A and C appeared to become more disturbed and "turbulent" than previously. The majority

showed changes for the worse, so much so that an attendant complained, "I don't know what's come over these patients today—they're beating us up."

This apparent relapse of patients in Groups A and C during the second and third weeks after the switch-over to active alkaloid, probably representing the turbulent period described by Barsa and Kline, had not been observed in the initial stages of the experiment in groups B and D. This may be attributed to the larger initial dosage. Groups B and D showed gradual and satisfactory improvement with only euphoric symptoms appearing where turbulence appeared in Groups A and C.

During the third and fourth weeks a sharp improvement in the condition of these patients took place, so that the scores at the end of this week for Groups A and C were similar to those obtained at the end of the first week with Groups B and D. The course followed during subsequent weeks by these cases did not suffer from that observed in the earlier groups treated in the study.

After the tenth week of the investigation, it was possible to organize successfully the reserpine patients and hold tea parties, sewing circles, walks, dances, bingo parties, musical get-togethers, with the patients assisting in the arrangements. The number able to assist with ward work rose sharply and the general atmosphere prevailing on the floor housing the treated patients contrasted very favorably indeed with the noisy, rowdy, belligerent, and uncooperative attitude on the untreated floor.

The length of home visits for patients on Serpasil increased. However, many who had made sufficient recovery to return home were unable to do so because they had lost contact with their families and relatives. Of the remaining patients, 50 per cent made good to moderate improvement and 25 per cent showed very little change.

Groups C and D both received electroshock and Groups A and B did not. This provided a means of studying the effects of electroconvulsive therapy alone and as an adjunct to reserpine treatment compared with controls.

The graph (fig. 4) illustrated the relative differences in the four procedures employed. The use of electroshock alone, together with

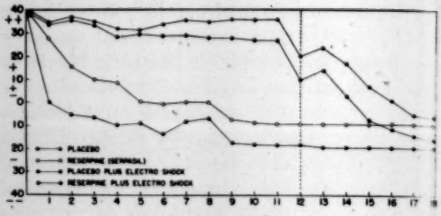

FIG. 4

TABLE 2.—SHOWING DEGREE OF IMPROVEMENT IN EACH GROUP

	++	+	+−	−	−−
November 29, 1954					
A	20				
B	20				
C	20				
D	20				
February 10, 1955					
A	18	2			
B	5	1	3	5	5
C	13	4	1		
D	3	4	4	3	6
April 2, 1955					
A	4	1	7	5	4
B	4	3	3	4	6
C	3	2	6	5	4
D	4	3	3	4	6

the attention involved in the management of the cases under study, produced an approximate ten-point improvement, which was maintained throughout the first part of the investigation. (See table 2.) However, only after the eleventh week, when Serpasil was substituted for the inactive placebo tablets, was improvement substantial. Similar results were obtained when the placebo tablets were switched for reserpine in the "placebo alone" group (A).

Except for the first two weeks, the difference between the groups receiving Serpasil alone and Serpasil plus electroconvulsive treatment was never large enough to exclude the possibility of error in scoring. The difference between the groups receiving placebos alone and the groups receiving shock and placebos was also negligible. After the twelfth week, when Groups A and C were switched over to the active alkaloid, both these groups behaved in a manner similar to that previously observed in Groups B and D.

Discussion and Conclusions

This study was undertaken to answer the question of whether reserpine (Serpasil®) had any therapeutic value in the chronic disturbed, long-stay schizophrenic and, if so, whether it was inferior to, equal to, or superior to electroshock as a maintenance measure. The findings obtained from over eighteen weeks of study have shown the superiority of reserpine over shock in this category of patient. Several other points have been clarified, and, in addition, certain interesting avenues for future work in establishing accurate indications for the drug have been suggested.

The end results obtained by starting with lower doses (2.5 mg. b.i.d. in Groups B and D) were as good as those in the groups receiving large initial doses (5.0 mg. IM o.d. and 5.0 mg. PO b.i.d.). In addition, control was achieved more smoothly without patients going through the turbulent period reported by Kline and observed by ourselves when large initial doses were given (Groups A and C).

A standard fixed dosage for all patients is unsatisfactory. Rather, the effects of the drug should be the guide to required dosage. Where no physiological response is obtained, the dose may be considered to be too small. At the other extreme, when a generalized tremor, severely troublesome drooling, and deep limb pains or even mild convulsive seizures are seen, the dose is unnecessarily large. These effects cannot be accurately described as toxic effects and each one is rapidly reversible. The pseudo-Parkinsonism is relieved within three days by reducing the dose by 30 to 50 per cent.

It would seem that the flushing, the conjunctival injection, the clamminess of the skin, the lowered pulse rate, the fine tremor, and the hypersalivation are useful features insofar as they indicate that the drug is taking effect. These features do not persist even when the dose is increased, and in most cases where the drug is not pushed until a gross tremor is obtained, they disappear after the third week except for the hypersalivation.

It is suggested that during the first three weeks the patient should be brought under control with gradually increasing doses. Intramuscular injections of 2.5 mg. night and morning, preferably twelve hours apart, for the first week, replacing the intramuscular injections with oral administration during the second week in all the patients able to take the medication by mouth with 5.0 mg. orally b.i.d., and in the third week going on to oral medication entirely appears to be a satisfactory method which has few disadvantages. Booster doses and several dosage adjustments were found to be essential to the management of all cases. Those patients who were maintained at a stage just short of moderate tremulousness and excessive drooling showed the better ultimate results. The problems arising from hypersalivation, excessive secretion from the bronchial tree during shock, and the slowness of respiratory recovery after electroconvulsion represent in most cases only minor problems, which prompt management readily controls.

It is possible to argue from the findings that reserpine, with electroshock as an adjunct, is the method of choice among the possibilities studied. The case for this method is strong when the results of only the first four weeks are considered. It may be that one short course of electroshock of about four treatments at the commencement of Serpasil therapy may be advantageous. Certainly, the first electroconvulsions administered after one week of reserpine injections appeared to augment strongly the effects of the drug. However, the beneficial influence of shock as an adjunct was not seen in nearly the same degree in subsequent weeks. Shock alone in this class of patient does not compare favorably at all with Serpasil, which is superior. Therefore, electroshock can be described at best as a useful accessory method.

It must be borne in mind that the great majority of chronically ill schizophrenics have had electroconvulsions and can be justifiably described as "shock failures." Several of the cases currently studied have had several hundred shock treatments, with transient effect or none. Such patients form a substantial proportion of the mental hospital population of any country. It is in this class of patient that the effects of Serpasil appear greatly superior to the results obtained from electroshock.

Although reserpine treatment promises to supersede shock treatment in the majority of chronically ill long-stay disturbed schizo-

phrenics, it has some disadvantages. For the first few weeks, the process of bringing the patient under control requires constant and skilled medical supervision. The physiological effects which determine the daily dose must be understood, so that the patient is always maintained at the optimal level. It is slow-acting in terms of clinical results, so that a period of about seven weeks of observation and management is necessary to obtain optimal response in the average patient. Also, its long-term effects have not yet been completely studied. Its possible effects on diencephalic centers and the amygdaloid nucleus and its influence on cerebral metabolism are unknown.

However, Schneider and his colleagues have shown that the action of Serpasil on the autonomic nervous system is apparently due to an indirect depression of the hypothalamus.[19] The significance of the edema observed in some patients is not yet clear, but it might be explained by the findings of Gaunt *et al.*, which suggested the hypothesis that reserpine may, to a slight degree, stimulate the release of the antidiuretic hormone of the posterior pituitary.[5] In spite of its sedative action, quieting uncontrolled emotional behavior, Monroe has shown electroencephalographically that this differs from normal sleep and the hypnotic action of the barbiturates. The EEG of the reserpine-treated patient resembles that of the awake individual.[12] The problem of the severely ill chronic schizophrenic is so distressing a human problem and so serious a national problem that the advantages of this drug in this category of cases would seem to outweight any side effects future studies may reveal.

Although a detailed classification of these very-long-stay disturbed patients in terms of the accepted clinical categories was considered irrelevant in a comparative study such as this, it should be stated that the catatonic patients showed a minimal response to treatment, whereas the paranoid type gave better responses. The hyperactive, assaultive, irritable, unpredictable, destructive, and dirty patients, irrespective of diagnostic type, appeared to give the best results. Electroconvulsive therapy may be a useful accessory method during the initial stages of reserpine treatment.

On reserpine alone, 25 per cent of such cases are markedly improved; another 50 per cent moderately or mildly improved; and the remaining 25 per cent remain unimproved. The findings indicate, therefore, that reserpine has a definite place in psychiatric hospital practice.

Summary

The effect of Serpasil was studied in 80 severely ill long-stay schizophrenic patients to determine whether its use would prove superior to, equal to, or inferior to electroconvulsive therapy as a maintenance measure.

These patients formed a homogeneous group of "difficult management problems," requiring excessive medical and nursing care, restraints, heavy sedation, seclusion, hydrotherapeutic and pack treatments. They were divided into four matched groups of 20 each, receiving: A, placebo; B, Serpasil; C, placebo and electroshock; and D, Serpasil and electroschock. To avoid prejudice in the evaluation of improvement, no one except the author knew the design of the experiment.

Two standards for measuring improvement were employed: first, amenability to nursing procedures and the change in the patient as a ward citizen; secondly, clinical improvement, based on psychiatric interviews. The senior nurse and her assistant evaluated the amenability of the patient weekly. The author and a physician with long knowledge of the cases but with no knowledge of their experimental grouping determined the clinical scores weekly for the first eight weeks and then fortnightly. The scores were expressed numerically and plotted graphically in addition to the full recording of medical opinion.

The results howed that Serpasil produced beneficial effects which were superior to maintenance shock treatment in the severely ill long-stay schizophrenics. Twenty-five per cent of these cases were markedly improved; 50 per cent were moderately or mildly improved. The remaining 25 per cent, although psychiatrically unimproved, were easier to manage from a nursing standpoint.

These results and the techniques of administration of Serpasil are discussed. Best results were achieved by starting with 2.5 mg. parenterally twice daily for the first week and transferring the patient to 5.0 mg. orally twice daily during the second week. Thereafter, the most satisfactory regimen was one that

employed individualization of dosage. It is emphasized that favorable results were obtained in cases which had not previously yielded to one or more known methods of treatment.

ACKNOWLEDGEMENTS

The author is indebted to Dr. Blashko, Commissioner of Mental Health, State of Connecticut, and to Dr. William Green, Superintendent of Fairfield State Hospital, without whose enthusiasm and support this investigation would not have been possible. He wishes to thank Dr. J. E. Oltman for making available the case material and for her independent opinion at the clinical evaluations and Dr. Edward M. Wisniewski for his assistance in assembling the data for Table 1. He is grateful to the nursing staff and to the staff of the occupational therapy department, whose cooperation contributed substantially to the success of the study. Credit is due to that exceptionally skilled psychiatric nurse, Miss Leota Brinton, under whose devoted nursing supervision this investigation was carried out.

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THE PROBLEM OF TIME IN PHILOSOPHY, NEUROPHYSIOLOGY AND PSYCHIATRY

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Philosophy often originates some very significant ideas which serve to stimulate thinking and investigation in many fields of science. Thus it performs an important integrative function, as exemplified in recent scientific interest concerning the classical philosophical problem of time.

In his book, *Time and Free Will* (2), Bergson brings together a number of concepts of great importance in philosophy, neurophysiology, and psychiatry. The purpose of the book is to point out the artificiality of scientifically measurable time as opposed to something Bergson calls "real concrete duration". Note the subtitle of the book: An Essay on the Immediate Data of the Consciousness. Here we already find a prophetic hint that discussion of Bergson's conclusions about time and the conscious mind would prove to be very much involved in the recent day findings of investigations in the mathematical biology and physiology of the nervous system, on the one hand, and in psychiatry, on the other. This problem, in fact, forms one of the integrating links in physiological and psychological investigation, as we intend to point out.

Returning to the book, it bases its arguments on the questionable hypothesis that "greater" and "less" imply space. What Bergson seems to be really driving at, however, appears later on in his work. This is the proposition that space is homogeneous and belongs to the external world, whereas *duration* and *succession* belong to the intellectual apparatus of the conscious mind.

For example, in sleep, where our perception of space is no longer intellectually ordered, our notion of time is freed of the bounds which consciousness imposes upon it, and becomes "instinctual" in nature. It follows that because of this instinctual and personal nature of Bergson's "real" time, there occurs an intermingling of past, present, and future, which we characterize intellectually as gross distortions in time perception. Bergson's point is that "instinctual" or "real" time is perceived *only* in this manner, and it is the work of intellect to superimpose an abstract succession in space upon our natural perception of time. We then get into the habit of a social or intellectual interpretation of time, which masks the "real" nature of the phenomenon.

This philosophical argument is supported by psychology which describes how in states of alteration or disturbance of intellectual conscious processes, whether due to sleep, drugs, disease, etc., there occurs what appears to the intellect to be a remarkable distortion of time perception; and the past, present, and future become kaleidoscopically intermingled.

The argument is also supported by cybernetics, or the mathematical study of automata (12). Here again a distinction is made between the "Newtonian" time inextricably bound up with intellectual calculating processes, and the "Bergsonian" time in which the automata really seem to exist.

Even more remarkable distortions of our perception occur in schizophrenia, where not only time perceptions but space and motion perceptions are capable of being twisted completely, as a secondary feature to the fragmentation of the personality. This is of extreme interest to both philosophy and psychiatry, as was recognized by Schilder (9).

For example, the present author recalls a case in which an acute schizophrenic episode was preluded by the chief complaint of the patient that "all the clocks in the place are slowing down"; the clocks were reported as becoming slower and slower until finally "all the clocks have stopped"—and the patient became acutely psychotic. It is probable that what is being referred to here is the classical sense of impending fragmentation of the whole mental works, found in patients approaching the beginning of a schizophrenic episode. But what is interesting is the expression of this slowing of the mental works through disturbances in conscious time perception, again indicating the close relation of time peception to psychological status.

Schilder cites a number of similar representative cases in both depressive reactions and schizophrenic reactions, in which the intimate relation between time perception and the psychological status is obvious. He concludes that time experiences cannot be isolated from our aims in life or from our relations to the future.

Thus, psychiatry also insists that our fundamental perception of time is what Schilder calls "biological". That is to say, time perception may be distorted like any other perception; the experience of time is interwoven with the emotional factors and the actual biological situation of the percipient. Who expresses this better than Proust—*A la recherche du temps perdu*? (says Schilder).

Psychoanalytic psychiatry also would tend to support Bergson and Proust when they insist that the social or intellectual perception of time is basically tied up with psychological conscious awareness, as Freud has pointed out:

> The processes of the system Ucs are timeless; i.e. they are not ordered temporally, are not altered by the passage of time, in fact bear no relation to time at all. The time-relation also is bound up with the work of the system Cs (4).

In this passage we have an integrating viewpoint of extreme interest to philosophy, neurophysiology, and psychiatry. When one approaches the study of neurophysiological time or true "instinctual" or Bergson's "real" time, one becomes involved in the investigation of the unconscious! Even Bergson is aware of this fact, for he writes:

> Pure duration is when our ego . . . refrains from separating its present state from its former states. It forms the past and present into one organic whole, where there is mutual penetration, succession without distinction (2).

We cannot go too far with our integrating viewpoint because there are serious faults in Bergson's philosophy. One must agree first of all with Russell's criticism (8) of Bergson's arguments, which he shows to contain serious syntactical and analytical shortcomings. There is beautiful poetic vision in Bergson, but the arguments leading up to the visions are unfortunately often characterized by mere play on words. When Bergson becomes mystical with his concept of "real duration", we scientists must part company with him. The definition of "real time" is an exceedingly complicated problem, and one must be very careful not to fall into the medieval error of giving a metaphysical "reality" to such an intangible, and then endlessly discussing it without hope of ever actually gaining empirical knowledge of the subject.

Bergson's important contribution from the scientific point of view is to emphasize that two important problems are involved in our consideration of time. These are: 1) how the conscious intellect perceives the flow of time and 2) the question of the existence of a true philosophical time, which is different from that which our intellectual perception of time would lead us to believe. His actual argument rests on a confusion between the biological basis for our sensation of the passage of time, which tells us nothing about the "real" or intrinsic nature of time, on the one hand, and this "real" or intrinsic nature of time, on the other. We wish to discuss and to separate these for the purpose of demonstrating the contributions of psychiatry to our understanding of time. Therefore, we have really three problems: 1) how the conscious intellect perceives the flow of time; 2) the biological basis for our sensation of the passage of time, or what might be called "primitive instinctual" or "biological" time; and 3) the "real" or philosophical nature of time.

Schilder describes the processes involved in our conscious intellectual perception of time:

> There are the perceptual data, the sensations in ourselves, the world outside, the objects and the data coming from our bodies. There is also the living individual with his drives and urges who by a process of continual construction and reconstruction gives final shape to objects and to their relations in time. These constructive energies in ourselves bring final order into our experiences and so create the final perception of the flow of time (9).

Sullivan (10) suggests that a "*phasic*" variation of living between waking and sleep, and of physicochemically conditioned recurrent needs and satisfactions, is basic and primary in human life. It is easy to see that the infantile prototype of time sensation may arise from this situation. Lewin (6) similarly cites the original infantile repetitive situation of hunger, oral satisfaction, and sleep, which

suggests the same kind of basis for the instinctual primitive sensation of the passage of time. These theories could be used to explain why there is a difference in time perception when the normal processes of conscious awareness are disturbed, on the basis of the regression that occurs under such conditions from normal intellectual perception of time to the primitive biological sensations of time.

Freud in the *Interpretation of Dreams* (5) suggests that the psychic system has a direction and that excitations traverse the system in a certain temporal order. Organization in time of conscious awareness seems to be based on this ordered flow of psychic processes. When the excitations in the system follow what Freud calls a "retrogressive course", which is neurophysiologically equivalent to the situation of regression described above, as in conditions of sleep, psychosis, etc., one gets the kaleidoscopic mingling of past, present, and future appearing in the conscious, as previously discussed. This description is as far as we can go in understanding the variations in time perception that occur under various biological conditions. It has nothing to do, as Bergson thought, with revealing the "real" or "philosophical" nature of time, but is a psychological phenomenon with concomitant neurophysiological events. With Bergson, the conscious time perception is postulated to be based on an indigenous mechanism of the intellect by means of which an order is brought into our state of conscious awareness. The intellectual perception of time is thus tied in with conscious awareness in a way not clearly understandable at present. An examination of how this actually occurs is tied in with problems in the neurophysiological functioning of the nervous system, which have been thoroughly discussed in another communication by the author (3).

What can be said about the "real" or philosophical nature of time? It is embarrassing to admit that centuries of philosophical discussion of the intrinsic nature of time have not yielded more fruitful understanding than is to be found in Book XI of St. Augustine's *Confessions* (1). The following summary in modern terminology of our present understanding of the intrinsic nature of time in philosophy, neurophysiology, and phsychiatry presents essentially the same propositions as those of Augustine.

These basic propositions about the nature of time are:

1) There can be no such thing as "absolute time"—time depends on creation, and before that there was no time; in fact the question "Can there be time without matter?" is a nonsense question. This relativistic theory of time in Augustine is more advanced than Newton's dichotomy of "absolute" and "relative" time (7).

2) Time is something subjectively known but not explicable in a scientific "thing-language". Augustine in holding this view is being too extremely subjectivistic; perhaps one should say, "time is something subjectively understood, but only indirectly or partially explicable in public language".

3) There is only the "atomic" present or "here-now", a view found in Augustine and as modern as present day science, and found for example in Whitehead's philosophy (11). Past exists in the present only as memory traces distorted by the subjective personality of the individual. This argument avoids the play on words and confusion of Bergson, and is fully supported by modern philosophy and psychiatry.

4) Time is *measurable* in scientific terms only when projected by the intellect into some kind of succession, usually in space, as previously discussed.

With the review of these four fundamental propositions about time, we have formed a nucleus for the integration of some very important thinking about time in neurophysiology, psychiatry, and philosophy. The reader is invited to continue with his own speculation from here, in one of the most fascinating of problems.

The author would like to thank Dr. Joel Handler for his valuable suggestions in the preparation of this paper.

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SEMANTIC APHASIA

A Clinical Neuropathological Study Including a Report of the First Known Case of Semantic Aphasia with Complete Examination of the Brain

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Head's Classification of Speech Defects Resulting from Brain Lesions

The various defects of speech produced by a unilateral lesion of the brain were classed together by Henry Head as *disorders of symbolic formulation and expression*. They were believed by Head to belong to a high order in the psychical hierarchy. Head taught that all these forms of psychical activity are rarely disturbed uniformly in any one instance. Thus originate diverse "types" of aphasia, each of which represents some particular form of functional derangement. Head's principle of classification is embodied in the following statement: "Each clinical variety represents some partial affection of symbolic formulation and expression; the form it assumes depends upon the particular modes of behavior which are disturbed or remain intact" (1). The reader of Head's writings on aphasia cannot escape the impression that the eminent British clinician did not feel at ease when yielding to classification. In fact, he wanted his reader to conceive his classification as a very flexible one. As pointed out on a previous occasion, Head's approach toward aphasia certainly was an enlightened example of an anti-ontologic method. He assumed that there were no such things as "types" of aphasia. He was so anxious to avoid any term recalling the famous medieval "faculties", their derivatives or clinical entities (such as "general understanding", "aphasia", "amnesia", "memory"), that he wanted even to refrain from using words such as "reading" and "writing" (which he declared to be only *a priori* conceptual terms), but "simply to observe what did actually happen" (5). Six years later Head declared that the acts of speaking, reading, and writing are more or less disturbed whatever the primary nature of the defect. It remains true, however, that he committed himself by a classification into four types; 1) the verbal defects consisting primarily of defective word-formation and reduced vocabulary; 2) the syntactical defects in which the patient talks jargon; 3) the nominal defects in which there is no difficulty in shaping words or phrases, but a disturbance of their nominal significance.

These three types of aphasia could be brought with some success into line with the traditional nomenclature; thus they found their ways, though still on a reduced scale, into the diagnostic terminology of physicians and psychologists. But the fate of Head's fourth type remained an unhappy one. He called it semantic aphasia. It never became very popular.

Definition of Semantic Aphasia

It is just this type of aphasia which must challenge the psychologically-minded investigator of speech defects resulting from brain lesions and which must capture the interest of those who are attracted by one of the cardinal problems raised by aphasia, namely that of the interrelation of speech and thought. In this disorder of symbolic formulation, Head said that the fault is essentially a want of recognition of relative significance and intention. Everything tends to be appreciated in detail, but the general significance is lacking. One might raise the question whether this variety can still be classified with speech defects. Head himself speaks of a loss of power to appreciate or to formulate the logical conclusion of a train of thought or action (5). The want of power to combine details into a coherent whole is peculiarly evident when comprehension of a printed legend is necessary for the complete understanding of a picture. In consequence of this difficulty in appreciating the full significance either of pictures or of print, most examples of pictorial humor are incomprehensible. Head's

clock test as well as the hand, eye, and ear tests is badly executed in semantic aphasia. Moreover, it is not the detailed significance of numbers that is at fault, but rather the general conception of the acts of addition and subtraction. There is also a want of ability to relate things to one another and, subsequently, to draw a ground-plan. These patients cannot play games such as chess, draughts or cards.

Cerebral Localization

Through Hughlings Jackson's clinical discovery of the motor area, the British school of neurology had made the initial, the most uncontested and perhaps the greatest contribution to cerebral localization. But the same school of neurological thought remained thoroughly critical and reluctant in all attempts to secure to nervous functions their regional sites in the brain. It was Jackson himself who very early warned against the temptation to derive from regional lesions associated with functional disorders the conclusion that the undisturbed function has its site in the same region. The warning is as timely today as it was in the days of Hughlings Jackson (4).

In his attempts to localize the various types of aphasia, Head remained as cautious and as hesitant as in his effort to classify speech disorders resulting from brain lesions. His material consisted of gun-shot wounds and the removal of non-malignant tumors. These injuries, he confessed, are of less localizing value than cases in which a complete microscopical examination could be carried out. Remote effects and the frequently diffuse character of lesions were justly believed by him to further limit the scope and conclusiveness of his localizing efforts. With these restrictions in mind, he arrived at the conclusion that in those instances where the disturbance of speech assumed a semantic form, the main lesion lies in the region of the supra-marginal gyrus. In all cases of aphasia he made the observation that the deeper the lesion extended the more severe and lasting was the disorder of speech.

Report of the First Known Case of Semantic Aphasia in Which a Complete Examination of the Brain Was Made*

Case History

At the age of 62, this right-handed male patient, while working at home, suddenly was unable to speak; he just mumbled. His mouth was drawn to the left side, and he was unable to use his right arm and leg. This episode lasted about 20 minutes with apparent complete recovery. But he continued to have similar spells, though less severe. A few months later, he came home from work, complaining of inability to think. He appeared to understand questions, but was unable to answer them. He was admitted to the N. General Hospital where his speech was found to be slow and his blood pressure 180/94. A diagnosis of cerebral thrombosis due to arteriosclerosis was made. He remained only a few days in the N. General Hospital. In the following years it became obvious that he was unable to remember things; his reading became poor. There was also a change in his attitude towards his family and in his general conduct. It was reported that he was depressed, quick-tempered, irritable, and restless. His right side remained paralyzed. The whole condition gradually became worse, leading to commitment to E. S. Hospital. He was 71 years of age at the time of his second and final commitment which was preceded by a period in which he was found unable to talk; nor could he be understood. His spoken language was reduced to a few words, such as "I don't know" and "no", and at that time it was practically impossible to carry on a conversation with the patient. He was, however, found to be able to follow simple directions. Two years prior to death, when his speech was tested by this writer, a rather long, complicated and involved conversation could be carried through, and there was no major defect in understanding. At times he was slow, and he realized this defect, stating that sometimes he had diffi-

* Observation made by the author as Consultant Neuropathologist to Eastern State Hospital Williamsburg, Va.

culty "to interpret people." From time to time there was a slight difficulty in pronunciation, but never any major defect in spoken language. His spoken language was well organized from a syntactical viewpoint. Nor was there any difficulty in finding the right terms. The vocabulary did not seem to be reduced. Nor was there any disturbance in repetitive language. The patient was able to read and to write, though none of these acts was thoroughly tested. When pictures were shown to the patient, he was perfectly able to identify objects and details, but *completely unable to grasp the meaning of the pictures or the whole of the situations reproduced.* He misidentified a person in a white uniform as a doctor, though it was very obvious from the whole that the person was a cook. On another picture he identified correctly knives, spoons and forks, but did not realize that the display of these goods was made to the reader of the magazine for reasons of propaganda and sale. There was also an inability of the patient to grasp jokes and involved but amusing sentences or, generally speaking, the essentials of acts and intentions. Those were the major, if not the only, defects. The diagnosis of a semantic type of aphasia was made, and a vascular lesion in the parietal area of the left hemisphere suspected. Patient died at the age of 71. Anatomical findings were: extensive left cerebral lesions, mural thrombi of left auricle and ventricle, generalized arteriosclerosis and left hypostatic pneumonia.

Gross examination of the brain. The left hemisphere was found to be increased in volume, particularly in its posterior areas. The temporo-parieto-occipital areas were extremely soft in consistency, and the pia mater in these areas was thickened and opalescent. The basal vessels showed a marked degree of arteriosclerotic changes. Two deep depressions could be seen in the left frontal lobe, one of them involving Broca's area and the neighboring convolutions, the other the posterior ends of the second and third frontal convolutions. Thus, the entire left third frontal convolution was involved in encephalomalacia. On sectioning, the lesion did not seem to extend beyond the cortex. As to the major softening involving the parieto-occipital areas, it was found to destroy almost the entire left occipital lobe, especially its lateral parts. In the parietal areas it was mainly the inferior parietal lobe which was softened with only minute and strictly cortical areas of softening in the superior parietal lobe. The left temporal lobe was only involved in its basal aspects and here only in its most posterior regions. In other words, the major area of destruction involved the entire occipital and inferior parietal lobes.

Microscopical examination. On Nissl stained sections the destroying lesion again was seen to involve almost the entire left hemisphere, more especially, frontal, temporal, parietal, and occipital areas. In the frontal areas the third frontal convolution was found to be the site of the most anterior part of the lesion. In the temporal lobe it was the third temporal convolution and the mesial structures of the temporal lobe which were involved in the softening, leaving in these areas no structures which could be identified. Similarly, the inferior parietal and the lateral aspect of the occipital lobe were almost totally destroyed. In all areas the lesion was cortical and subcortical in site. But subcortical destruction seemed more marked in the posterior, namely parietal and occipital areas, than in the anterior ones. The insular lobe did not seem to be affected. Nor were the basal ganglia sites of major lesions. Heschl's convolutions and area 17 also were spared.

On Weil-stained sections (figs. 1–4) the white matter of almost the entire left hemisphere was demyelinated. Least affected were the anterior regions of the temporal lobe. The U-fibers were remarkably well preserved (figs. 2 and 3), obviously providing for associative activities of preserved and still functioning cortical areas neighboring each other. Similarly, the myelinated fibers of the corpus callosum were spared, again providing for associative activities of the two hemispheres and thus speaking in favor of a continued functioning of the damaged left hemisphere or, at least, its remaining parts. After all, the speech defect, compared with the structural one, was relatively mild in this case.

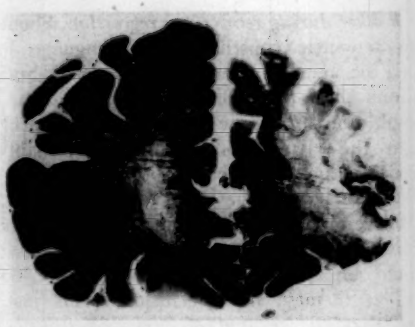

FIG. 1. Weil stain. Destroying lesion at its most anterior level, involving the second and third frontal convolutions of the left hemisphere. Note bilateral demyelination and status desintegrationis.

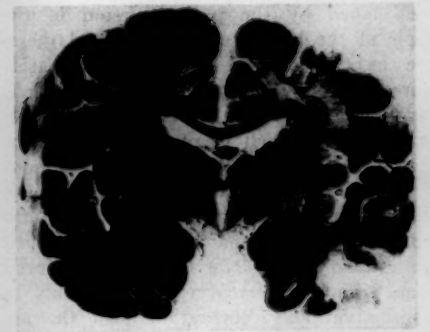

FIG. 3. Weil stain. Lesion at parietal and storipallidal levels; same changes as in figures 1 and 2 Basal parts of the left temporal lobe destroyed.

FIG. 2. Weil stain. Lesion at a more posterior level. Complete demyelination of the left hemisphere with preservation of U-fibers and corpus callosum.

FIG. 4. Weil stain. Left occipital lobe, almost totally destroyed; cortex less affected than white matter.

While there was no doubt that the critical area of semantic aphasia, namely the left inferior parietal lobe was the site of a superficial and deep destroying lesion (fig. 3), the latter was much more extensive and destructive than in Head's traumatic cases. Moreover, the right hemisphere was also the site of multiple though minute lesions assuming the so-called status desintegrationis which was also encountered in the left hemisphere, side by side with the large focus of encephalomalacia. In brief, the entire brain was affected in a diffuse fashion.

Interpretation

This case brings to light many of the great and often insurmountable difficulties involved in cerebral localization and the multiplicity of problems raised by our attempts to assign to a given syndrome its presumable site. In fact, the diffuse character of the lesions makes it nearly impossible to correlate in our case the semantic aphasia with a circumscribed lesion. It is true that the involvement of the left inferior parietal lobe was included in the focus of destruction. But are we allowed to isolate this area from the rest of the lesion and to make it the true, if not exclusive, site of semantic aphasia? Do we really know the

role played by the parietal lesion in the whole of the lesions encountered and therefore in the genesis of semantic aphasia? Moreover, the left gyrus supra-marginalis was not destroyed in its entirety; the preserved part, though small indeed, could be identified as area 40. Evidently, the amount of preserved tissue was not sufficient to prevent semantic aphasia from coming into being, once the vascular lesion had destroyed the critical areas. Nor did the preserved tissue admit of a recovery, were it only in combination and cooperation with the activities of other undamaged areas. In this respect it remains remarkable that verbal defects appeared only at the initial and terminal stages of the history of aphasia, and only as *transient* defects at the initial stage. Though the major part of the left third frontal convolution was destroyed, remnants of areas 44 and 45 escaped. Should we conclude that the physiological and psychological processes implied in semantics are more vulnerable to regional brain lesions than those implied in verbalization? Should the latter need relatively less cerebral tissue for its continued functioning than the semantic process? The histopathologic structure of both the frontal and the inferior parietal areas involved in the softening was identical. In both areas a spongy state was conspicuous in the upper layers of the cortex; the latter was invaded by connective tissue fibers in whose meshwork numerous granular corpuscles were caught. There were also many new-formed vessels. The identity of the histopathologic structure suggests an identical age of the lesion. This conclusion is of importance since it forbids us to assume that the verbal defects observed at a late stage of the history of aphasia would have to be attributed to a new lesion. In fact, we have to deal with a *difference in vulnerability of different speech constituents to the same lesion*. One is reminded of Monakow's (3) views, according to which the *clinical varieties of aphasia are but stages succeeding each other during recovery or regression*. Should the semantic constituents of language indeed be more vulnerable to regional brain lesions than those implied in verbalization, should the former be likely to suffer earlier than the latter, and should the semantic processes need a relatively greater amount of undamaged tissue than verbalization, the obsolete dictum that the more refined mental activities the more voluminous the brain would unexpectedly gain new support. Be this as it may, the conclusion seems justified that *the relation of preserved functions to the residual mass of the critical areas of speech varies according to the various components of language implied in the varieties of speech disorders*.

The significance of the amount of tissue destroyed for the genesis of nervous symptoms and their recovery was first stressed by Flourens. It was re-affirmed and restudied on a large experimental scale by Lashley. According to Lashley's review (2) of the clinical literature on aphasia, there is also a quantitative relation between the magnitude of the lesion and the rate of reacquisition of speech. In the analysis here submitted, for the first time an effort has been made to correlate various types of aphasia and the preserved speech components implied with the amount of tissue preserved.

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MALINGERING—A SYMPTOM

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"He may be compelled by force, if need be, against his will, and without regard to his personal wishes or his pecuniary interests or even his religious or political convictions to take his place in the ranks of the Army of his country, and risk the chance of being shot down in its defense." Thus wrote Justice Harlan in an epochal decision. It was this decision that affirmed that citizenship in a free land carries with it the responsibility for defense of the freedom that is enjoyed. This decision upholding the legality of the draft in World War I changed the constituency of the American wartime army. It became possible to coerce a man into a military uniform, and this coercion forms the essential basis and prerequisite of the malingering reaction.

Malingering is the simulation of symptoms of illness or injury with the intent to deceive. Webster (67) defines it as follows: "Malingering or malingery: The act of a soldier or sailor who feigns himself sick or who induces or protracts an illness in order to avoid doing his duty; hence, in general, one who shirks his duty by pretending illness or inability." According to Schilder (56), malingering entails conscious efforts to imitate symptoms to obtain financial or social advantages.

My experiences, both in military service in World War II and in civilian life, have indicated that malingering is, on the contrary, quite common.

It should be pointed out that malingering is not a diagnostic term in psychiatry, nor is it properly a diagnostic term in medicine. The most recent diagnostic and statistical manual of the APA (1952) lists malingering under "non-diagnostic terms for hospital record."

My service on induction boards, in the course of which I interviewed over 100,000 men, and my contacts with many thousands of military patients in station, general and convalescent hospitals, led me to draw several conclusions in regard to malingering. It was my experience that about five per cent of all inductees malingered, and a slightly smaller percentage of all soldiers who were admitted to the service hospitals were also malingerers. In apparent refutation of this concept, in one station hospital at a time when 60,000 patients were listed in the registrar's office, there were but 17 "diagnoses" of malingering (.028%). However, intensive questioning of the medical officers revealed that they believed that there were many more cases of simulation than they had diagnosed, but they were deterred from making such a diagnosis because of inherent administrative difficulties (including "proving" the diagnosis at the court martial of the soldier accused of malingering).

A senior army colonel of 30-years service (Callard) felt that malingering was quite frequent and that goldbricking was endemic and ubiquitous (8). ('Goldbricking' is army slang for a less serious form of malingering where the purpose is to obtain relief from arduous or unpleasant duties for a short period by simulating disability or illness.)

Most of the papers written on this topic have shown confusion and bias. Many authors adhere to the extremely vengeful, materialistic viewpoint that all malingerers are criminally culpable, while others hold to the deterministic philosophy that deep unconscious, categorically imperative determinants make it impossible for the malingerer to act in any other way or manner from the one he displays, and therefore no culpability should be assumed. From the military standpoint, malingering is a crime which is punishable by court martial.

Much controversy has arisen on this point. Psychiatrists maintain that the normal person will never malinger and that the very existence of malingering is sufficient evidence for proof of a psychopathologic state to warrant rejection from the military service, or if the man is already in the service, to warrant serious consideration for discharge (13, 43, 50).

Expressing the contrary view, Osler said, "One thing is certain; that as society is at present constituted, it cannot afford to have a class of criminal automata and to have every rascal pleading faulty grey matter in extenuation of some crime" (51). Thus, Osler exhibited the prevalent reaction of the average physician and the layman to the frequently presented argument of the psychiatrist's "criminal by reason of psychic defection". But Osler's viewpoint was expressed in the eighties, and one may hope that some progress has been made since then in psychologic understanding. Nevertheless, Williams (69) felt that experienced psychiatrists rarely made the diagnosis of malingering, and commented somewhat caustically on the "unfortunate tendency" of psychiatrists to find everyone abnormal. He further believed that psychiatry was thus using deviation as an excuse for all anti-social activity, and he pointed out that this doctrine would lead to the end of all social responsibility because no one was free from some mental quirks.

The expression of such diametrically opposed opinions makes it high time for the psychiatrist to put his house in good order insofar as possible in this matter and to eliminate the psychologic forensic confusion which exists.

Malingering is as old as the history of man. Simulation or pathomimesis is a challenge to the histrionic capabilities and culpabilities of men and the acumen, insight, and sagaciousness of examiners. Nor is malingering as a mechanism confined to man alone, for it is seen in other species. The cat will pretend sleep to avoid frightening the mouse; the winded fox feigns death in order to turn away the pursuing dog; if flight is impossible, the opossum and the snake act dead when in danger; and certain birds drop their wings and appear crippled in order to protect their young (10, 34).

The child's complaints of an ache or pain when faced by an examination in school, his mother's headaches when disagreeable social engagements loom, and his father's complete fatigue when the unwanted moving picture is the evening's program, are all manifestations of mild malingering.

In this paper I am not considering the minor peccadillo such as the soldier who will on occasion claim a headache or backache in order to avoid a single unpleasant or unwanted duty (goldbrick!). Rather, I am considering men who malinger to evade service completely, to get out of service, or to escape dangerous duty. I would here point out that although malingering is fraud in relation to health, it is not always frowned upon. The soldier who lies on the field pretending death only to rise and take the enemy from the rear is certainly not considered reprehensible.

Throughout this discussion I shall not consider "negative malingering," which is really a misnomer by which certain authors have characterized dissimulation on the part of individuals who pretend health in order to get into or stay in the service, but only positive malingering or pathomimesis which occurs in those who simulate to stay out or get out of the service.

Glueck (23) divides malingering into three categories: 1) malingering of the insane; 2) malingering in the mentally normal; 3) malingering in the borderline group, which he considered as "potentially insane and verging on psychosis." It is my impression that this constitutes over-simplification of the problem. Where in these classifications does one place the malingering of the psychopath, the psychoneurotic and the mental defective?

However, I believe that Glueck approaches the subject of malingering correctly inasmuch as he recognizes the necessity of discussing it in connection with basic conditions under which it occurs. Malingering cannot be considered independent of the personality types who employ it or of the pressures which occasion its manifestations, any more than a physician can treat a fever independent of the disease or infections that cause it.

Psychosis

No one assumes the presence of guilt when a person who is "non compos mentis" attempts to evade a duty. The law states, "It is elementary that an insane person is guiltless of criminal intent and is to be held as innocent of the offenses" (14).

Clayton, explaining malingering in the psychotic, felt that when one considers that self-interest is one of the primary life activities, malingering in the psychotic can better be understood as a defensive mechanism and not showing the same deterioration as other processes.

Many authors have commented on the fact that mild psychosis is frequently overlooked and diagnosed as malingery. In referring to malingering in psychotics, many authors have agreed that most instances of feigned psychosis occur in persons who are already of unsound mind.

If the definition of malingering is to include, as does that of many authors, "willful, deliberate and fraudulent", then certainly the term 'malingering' should not be applied to the psychotic because the acts of these individuals cannot be properly described by those adjectives.

Psychopathic States

The psychopath presents a problem closely similar to that of the psychotic, but in the question of the psychopath medical authorities have long been at odds. Even an acceptable definition as to what constitutes a psychopath cannot be agreed upon, nor is there agreement upon the culpability, responsibility or saneness from the legal standpoint.

Cleckley (11) speaks of the psychopathic personality as "semantic dementia"—a marked pathologic state where the patient is criminalistic, recidivistic, usually, but not necessarily, marked alcoholic, bizarre behaving and bewildering. His cases are not understandable to me unless they are considered as psychotic. In speaking of malingering among psychopaths he says, "Many psychopaths malinger at times. They seldom malinger consistently over long periods towards a constant aim. The malingerer pure and simple sticks to his purpose and on gaining his object uses it in some fairly human way."

The opinion of Jones and Llewellyn (33), in contrast to that of Cleckley in speaking of malingering in psychopathic personalities, is "Such malingering is a well thought out scheme to be adhered to at all costs. Once committed to a plan or campaign, they follow it out logically without contradicting themselves or falling into the snares set for them."

The Army classification of "Constitutional Psychopathic State (psychopathic personality)", used for most of the war, included criminalism, emotional instability, inadequate personality, paranoid personality, pathological liar, sexual psychopathy and unclassified. The tendency most noted, when dealing with patients in this category, was to have officers consider them as "heinous culprits".

The bibliography on malingering numbers hundreds of papers. Most of them deal with ingenious means and variations presented by the malingerers or with even more ingenious methods and apparatus for their detection (1, 3, 12, 15, 19, 20, 27, 30, 31, 35, 37, 38, 47, 58, 59, 64, 66). Only rarely is an objective viewpoint encountered in these papers. Most condemn the simulator with such epithets as "liar", "yellow", "scoundrel", "wretch", "knave", "rascal", and "unscrupulous".

Brussel and Hitch (6) felt that no individual who attempted to malinger should be admitted into the Armed Forces, and that if an individual is detected malingering after he is admitted to the Armed Forces, he should be immediately discharged to civilian life. Surprisingly enough, shortly thereafter they made the statement that 2–7 per cent of the cases referred for neuropsychiatric consultation were diagnosed as malingering. A procedure such as they recommended would soon result in decimation of the Army. If an individual knew that all he needed to do to get out of military service was to malinger some difficulty, there would be virtually no armed forces left in a very short time. There are also authors, however, who feel that the only way of handling malingering, which in essence they describe as the presentation of symptoms without organic basis, would be immediate and severe punishment.

Karl Menninger (40, 41) expressed very objectively the viewpoint that the psychiatrist scientist is unjustified in appraising the moral reprehensibility in the malingerer. He points out that the medical scientist may judge whether or not certain conditions are medically injurious to society. For instance, he justifies

the quarantining of patients with small pox; but, he emphasizes, the determination of the morality of illness is not in the physician's province, that it is the function of the physician to treat not judge upon the sinfulness of venereal disease; and he then adds that the scientist who becomes angry at his patient to that extent ceases to be scientific.

Unfortunately, Menninger does not attempt to untie the practical Gordian knot of military malingering.

Gill (21) feels that the individual who deliberately malingers should probably be rejected from military service anyhow. Campbell (9) feels that the malingerer shows "studied accuracy", and Dravo (13) feels that the mere fact that an individual will resort to malingering is a strong indication of psychopathy.

Since self-inflicted injury most frequently belongs in this classification, it is interesting to note that Babinski, Straum and White (2) each separately refuse to consider automutilation or malingering in any light except that of deliberate deceit. On the other hand, the attitude of Hilger (28) to these patients is that "the largest number of them are basically constitutional psychopathic inferiors."

It is in dealing with this classification of malingering that the greatest difficulty arises. This occurs because this diagnosis is so broad that it includes individuals with mild psychopathologic deviations and extends to individuals who may be pre-psychotic. Some of these, in which the concomitant findings are such as to indicate that the pathology is not profound, may be treated as Gill indicates with reasoning.

Mallinson (39) has indicated that punishment is a specific antidote for malingering, and he feels that early diagnosis and definite disciplinary action provided the prophylactic defense.

Most cases, however, fit that definition which states that the psychopath does not learn by experience, that he is recidivistic, and that discipline is ineffectual.

Oligophrenia

If malingering is at all to be considered as an adaptive phenomenon, then certainly in this rubric it has its greatest excuse for being. Just as Jones and Llewellyn state that most frequently it is the individual of unsound mind who feigns psychosis, so I have found that it is most frequently the oligophrenic who feigns feeblemindedness.

In many cases I have noted that individuals with definitely low intelligence will deliberately answer questions wrongly in order to give the appearance of even less intellect. In this classification is not included, however, the hypochondriasis of oligophrenia which is more closely akin to the conversions.

Psychoneurosis

A much-labored subject and one upon which violent argument has arisen is the differential diagnosis between psychoneurosis and malingering. Gill feels that the malingerer's performance is voluntary and consciously determined. The hysteric, on the converse, presents his symptomatology with unconscious determinancy. Bleuler (4) says, "One is inclined to assume consciousness when one observes purposive actions. This is not correct for even reflexes may be purposive; even an automaton may react differently to different situations, as in the case of the automatic scales at the mint." Henderson and Gillespie (26) have indicated that the difficulty may lie in the fact that malingering and hysteria may occur in varying admixtures in the same individuals.

Spaeth, in a lengthy article (62), shows many of the difficulties of differential diagnoses between psychoneurosis and malingering. He points out that showing that the patient with amblyopia can see, or that the patient with a paralyzed arm can move it, or the patient with an epileptiform seizure can be relaxed, is proof of neither malingering nor hysteria. He points out the very pertinent fact that only by confession can the differential diagnosis be made in most cases. He also emphasizes the tendency of patients to exaggerate, making the examiner's task more difficult, since when the examiner can disprove part of the patient's symptomatology, he feels that the rest of it has no logical basis either.

Pignataro (52) feels that a qualified psychiatrist can easily tell psychoneurosis from malingering since psychoneurosis is unconsciously motivated and malingering con-

scious and willful. If one accepts his concept, then many distinguished psychiatrists cannot consider themselves qualified observers since they readily admit their inability to distinguish between the two diagnoses in many patients.

Many authors have commented on the difficulty in establishing differential diagnosis between psychoneurosis and malingering, and possibly one of the best which is used to point up the confusion is the statement of Mallinson "... hysterical simulation where the patient wishes to convince others that he is ill without himself really believing it."

I feel that, owing to an enthusiastic and enterprising attitude, psychiatrists have succeeded in convincing their brother practitioners that malingering is quite rare, and that when it does occur, it must be considered in the form of unconscious expression which usually, were it understood in its true light by the patient, would be considered as reprehensible by him as it frequently is by others. Unfortunately in so doing, the psychiatrist has opened the field of escape to a personality type which is not in reality a psychoneurotic one. There are patients upon whom the diagnosis of psychoneurosis is made because they complain of symptoms for which the organicist can find no reason. This diagnosis is made despite the fact that there is no previous history of any kind which would presuppose such a diagnosis, nor is there anything in the patient's personality type that would substantiate such a diagnosis.

To so designate a patient because of backache for which the orthopedist can find no reason, stomach-ache for which the gastroenterologist cannot determine cause, or precordial distress which the cardiologist disowns is to state that physical medicine has reached the acme of perfection and that psychiatry must accept its deficiency if it is not able to find factors to substantiate a psychological diagnosis. This assumes that we practice a less scientific speciality, less based upon objective findings, upon anamnesis, upon perceptible signs, which *in toto* is a fallacious, illogical attitude that all psychiatrists should seek to combat.

No person should be designated as psychoneurotic unless definite scientific appreciable evidence can be elicited to substantiate such a diagnosis exclusive of his present symptoms. Nor should the psychiatrist be loath to say that no psychoneurotic syndrome is present and thus, when indicated, place the problem back in the hands of the other physician.

Fear States

I fully realize that this heading and general classification may provoke condemnation and that it is open to questioning concerning its ability to stand separate from the preceding. Yet, in the light of the findings of other authors, as well as my own, I feel justified in promulgating this as a separate category. Certainly one need not be psychoneurotic to fear danger-infested situations or to attempt avoidance or escape of discomfort, injury, mutilation or death.

Helgesson (25), Waud (65), Gillespie (22) and others all point out the power of the emotion of fear, the fact that often in war a man must go contrary to the great instinct of self-preservation and finds himself in a predicament from which there is no honorable escape. There can be no question of the justification of listing fear as a separate etiological rubric for malingery.

An editorial in The Lancet (36) shows the juxtaposition of psychopathologic and criminal designations given the soldier who fails for non-organic reasons to do his duty. "The soldier is posted at a certain point regardless of his inclinations, and he is not able to get out of the situation except by adopting neurotic procedures—absent without leave, amnesia and fugue states, and desertion."

That they were suffering from simple, unadulterated fear has been confided to me by a goodly number of selectees and soldiers who had been apprehended malingering. They stated, "I'm just afraid, that's all." In a far greater number, I have felt that fear was a motivating factor although it could not be patently elicited. It would be unrealistic to assume that all men who fear have sufficient fortitude to continue despite that fear to face reality in a straightforward manner. Nor do I believe that each of them that does succumb to this fear is unconscious of it and is truly suffering from the symptoms he may present.

Morale

Gillespie makes the statement: "Occupational dissatisfaction as a cause of psychoneurotic (and malingering!)[1] reactions is worthy of study. Such reactions are likely only when the job or employer or his surrogate has come to be regarded as an enemy." The importance of morale has certainly been overlooked by many authors who have discussed malingering, and most of the authors who have discussed morale have failed sufficiently to emphasize its effect upon malingering. "War is three-fourths a matter of morale. Physical force only makes up the remaining quarter" (46). One can note how perfectly morale can dispel malingering in many cases by the following excellent definition: Morale enables the individual to endure hardship, adversities, reverses, fatigue, hunger, physical discomfort, and even death threats; and Penfield points out that the specific antidote for psychoneurosis is high morale (53).

It was noted by those men who were working on examining boards at the time of Pearl Harbor that an immediate uplift in morale resulted in a decrease in the number of cases of malingering. Thus, for several weeks subsequent to Pearl Harbor when anger and passion were high, malingering was almost unknown. As the heat of enthusiasm subsided, malingering again occurred with great frequency.

Many authors have elaborated upon the necessity for intensification of loyalty and externalization of aggression. It must be remembered that during all the formative years of his life the American youth is directed away from aggression. Inflicting pain on another is severely reprimanded. He is trained in the humility of religion to "turn the other cheek". Strife is made repulsive; hate is frowned upon. This is the training of the child in a democracy hoping to live in a world at peace.

Little wonder that such a youth trained for about 20 years away from violence cannot learn systematic destructiveness in a brief period without some psychologic repercussions.

The malingerer has been regarded as a morally reprehensible weakling who somehow could act in a more socially acceptable manner if he but would. Almost no one has considered the fact that in many instances what is normally socially laudable may be the etiology of the malingering. More sympathy and encouragement are required to direct the American youth in the formulation of his aggressions in the proper manner and direction. One cannot train a man for 20 years away from aggression and expect him to properly learn that same aggression without sufficient indoctrination and training, without sufficient plaudits, and without sufficient praise.

A factor of great importance in producing malingering is a poorly presented propaganda picture resulting in the misdirection of the aggressive drives of the individual. Military service, despite the pleas of high ranking military authorities, is frequently regarded as a penalty or punishment. The individual who is in uniform serving his country too often is made to feel that he is "out of luck" instead of feeling that he is rendering his country its due, doing his duty, serving with honor and receiving the admiration and approbation of his countrymen.

For some time it was difficult to pick up a daily paper or listen to the radio without hearing such phrases as "work or fight" or "jail or Army". Too much then of the aggressive components of the personality instead of being directed against the common enemy are misspent in internecine strife.

Our propaganda should be directed towards the elimination of intra-group hostilities, towards the reemphasis of the existence of the common foe, towards our mutual gain and our possible mutual loss, towards the essential harmony of the democratic way of life, and towards the duty and privilege of each citizen to help defend that way of life.

Moore (45) states: "In some communities, until war is actually declared, men in uniform are discounted socially. After the declaration of war, however, their stock goes up." Unfortunately, not always enough. The civilian too often still regards the serviceman superciliously. Too often is seen the sign, "No Soldiers Allowed". A man, who can one day enter the finest hotel as a civilian, the next

[1] Author's insert.

day may be denied admission to this same hotel because he wears the uniform of the United States Army. But if after a period of time he is found to be inadequate, a criminal type, emotionally unstable, a misfit or something similar and is for one of these reasons discharged from the service, he once again is welcomed to the same hostelry. Because of this adverse state many a selectee visualizes his final acceptance into the service with mixed emotions. He is sad to leave his comfortable civilian status, his remunerative job, his feminine companionships, his home and family, yet somewhat proud that the Army does consider him a true adult man, morally, mentally and physically. As a soldier, he does not resent a man who has a criminal record being given a chance to "make good" or to use the armed forces as a step back into good social grace. But he does intensely resent the service being placed in the position of being the (better or) worse of alternatives, such as the "work or fight" or "jail or fight" previously described. He feels that his contribution to our nation and civilization deserves better than such implied opprobrium.

War to the average person is quite abhorrent. Considerable indoctrination is required in order to permit the individual to direct his aggression in the services of the nation rather than against his colleagues. This calls for knowledge of social and personal psychologic factors.

Discussion

Malingering cannot be considered a single entity, clear-cut, separate and distinct. Certainly scientific study will show in some cases that psychopathology is present, that the malingering of the individual is part of a life pattern which has previously been indulged in, or that it is a manifest evidence of mental disease. In those cases where this psychopathology is absent, we must seek other etiology. Malingering should no more be placed on the front of the chart as a final diagnosis than is the temperature in a case of pneumonia or the gastric analysis findings in a case of pernicious anemia.

In handling the malingerer, it is of utmost importance that the physician remember his rightful capacity. "... It might well be considered that a medical man, as such, has no special qualifications to decide whether his patient is guilty of fraud. In any case, if he is asked in court whether the claimant is a malingerer, it would be quite proper to reply that this appears to be a question for the court" (49).

I would estimate that about 10 per cent of the malingering I have seen has been in men who were essentially normal. By this I mean that no psychopathology could be uncovered. In evaluating normalcy, the reaction of Salmon, Chief of the Neuropsychiatric Service of the United States Army during the first World War, might be given great weight (55). He pointed out that the American soldiers developed more neuroses than the British. He felt that the American pattern of life was such as to be more fertile soil for the development of these neuroses (or malingering).

These same factors are productive of the very powerful nostalgic drives seen among soldiers. Nostalgia, in the hands of a good propagandist, instead of being a deterrent could be brought to the point where it could be a strong incentive to the military service. The individual could be shown where his loved ones, his home and his familiar scenes might be lost to him forever (16, 17).

The factor of fear can be handled by the propagandist so that the fear of possible defeat can be made greater than the fear of possible death or injury. While this cannot succeed in every case, in a great number it undoubtedly would.

Science and society have too long subscribed to the principle of "let the punishment fit the crime". It is high time to dispel this dogmatic thought and the rigid accompanying formula for punishment or threat of punishment as a basic curative measure. Instead of punishment it is time that we said that the therapy should be made to fit the individual.

Summary

Malingering is encountered in: a. psychosis; b. constitutional psychopathic states; c. oligophrenia; d. psychoneurosis; e. fear states; f. morale deficiencies.

The man who malingers is often free from pathology *per se*: When the pathology does occur within the man, it is thoroughly in the province of the psychiatrist. When the pathology occurs through the defection of the social environment, it is in the province, in addition to the psychiatrist, of the sociologist, the statesman, the press, the clergy and leaders in all policy-forming groups. When a man mirrors the faults of society at large, society and not the mirror is to blame.

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TRANSFERENCE AND COUNTERTRANSFERENCE IN SOMATIC THERAPIES

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Since the introduction of the shock therapies, there has been much controversy concerning their mode of action. In 1948, Gordon (11) was able to list 50 shock therapy "theories". The present article will not enter into the controversy but will adduce some evidence which will draw further attention to the psychological implications of the shock therapies. The psychological impact of shock therapy upon the patient has been studied by many authors. Reviews of the literature and new considerations have been presented by Abse (1, 2), Boyer (5), and Fisher, Fisher and Hilkevitch (7) among others.

An excellent review which presents both sides of the argument is that by Hill (13). In part of his study he reports the opinions given him concerning shock therapy by 11 Freudian and Jungian analysts. After reviewing the opinions of these workers, Hill states, "Many of my correspondents returned again and again to the idea of what matters is not what is done to the patient but *how it is done*, and this particularly applies to the treatment of psychotics. The whole question of the countertransference —the hidden unconscious attitudes of the doctor towards his patient, which motivate his behavior towards the patient and his responses to the patient's behavior—this is the urgent preoccupation of all those psychoanalysts and Jungians who are now working on the psychotherapy of the psychoses."

In this study we are presenting material which enables us to consider first the transference and then the countertransference aspects of somatic therapies.

PART I—PSYCHODYNAMIC ASPECTS

Discussion of methodology

Analytic psychotherapy of the neuroses and psychoses is not only therapy, or attempted therapy; it is also a useful research tool. Today, in some quarters, there is a tendency to minimize the value of clinical operational research of this kind without elaborations consisting of controls and statistics and experiments devised to make findings "objective". However valuable these refinements may often be, it is sometimes the case that obfuscation rather than clarification results. In this discussion, at any rate, no attempt will be made to refer to findings other than those achieved through research in the psychotherapeutic process.

Since psychotherapeutic operational research employed on its own has contributed considerable insight in regard to the origin and development of the neuroses and psychoses, and the operative forces and conditions in this development, it is no great step to its trial for the purpose of uncovering the forces at work in those therapeutic interventions into the natural history of these diseases aggregated as "shock treatment". As a matter of fact, it happens that when during the course of psychotherapy attention is focused *as occasion permits* upon the meaning to the patient of the shock therapy which has been at one time or another meted out, we are confronted by interesting and fruitful observations. The words "as occasion permits" have been italicized above because they indicate the fundamental condition which enables the more valuable observations.

It is possible, of course, to ask one by one a series of patients who had previously been exposed to shock therapy some such question as "What do you think of the treatment you had?" or "What did the treatment mean to you?" The question might be refined or altered one way or another in each individual case in an attempt at inducing valid communication, but the context of communication would thus never approach that achieved in prolonged intensive psychotherapy. Classification and statistical treatment of the replies, though interesting, would not repair any deficiency in the original context of communication. Obser-

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vations obtained *as occasion permits* during the course of psychotherapy are of an entirely different order. This is perhaps best demonstrated by a concrete example:

A highly intelligent and cultivated woman of 30 had suffered a severe depression accompanied by expressed suicidal wishes, and had been treated by a course of electroshock therapy (EST) with a favorable clinical result. One year later she suffered a relapse and was then brought into prolonged intensive analytically oriented psychotherapy. The psychiatrist who had one year previously treated her with EST reported that not only had she apparently recovered following the treatment, but that she had spoken of considerable gratitude for her relief. Indeed, this was attested by the woman herself during the initial stages of psychotherapy. The treatment, she reported, had been wonderful; and she expatiated upon the theme that it had relieved her of her feelings of ill-being, of morbid thoughts of self-destruction, and it had enabled her to recommence her work. However, *later on* in psychotherapy she was expressing views upon the theme that the shock therapist had perpetrated an outrage upon her person, that he had punished her without reason, and that he was a cruel heartless man.

This was later on, and she had never been questioned about the shock therapy directly. Since this is a common occurrence with patients in psychotherapy who have previously been exposed to shock treatment, it demands considerable scrutiny. We have first to understand the setting in which, and the time at which, the patient expresses views antagonistic to the shock therapist and the shock treatment, so contrary to her avowed initial attitude. Also, we have to understand that both the earlier and later communications about the shock therapy have a validity each in its own right, and taken together they communicate much more than a mere sum which would equal about nothing.

In this particular case, the antagonistic feelings about shock treatment were ventilated in a setting of talk about her father's punitive attitudes during her childhood. He insisted on her accompanying him every Sunday morning on a walk during which he regularly lectured her, expressing his disappointment with her and disapproval of her reported misbehavior during the week. For her, this regular weekly ambulation had been a repeated painful experience; it was following these reminiscences that she switched to talking about her regular shock treatments. Before she had come to these painful reminiscences and thus to express her hate of her father, she had been complaining that her therapist had little to say to her, let her do all the talking, and was losing interest in her.

Without going further into this setting, it is clear that this talk about her father's peripatetic lectures every Sunday morning took place under the sway of markedly ambivalent transference emotions, and this was followed by her attacking the psychiatrist who had first treated her, and by many elaborations about the shock therapy. Of course, it was easier for her to transfer her wrath to the other fellow, and thus split her father-figures into the good and the bad; that was a help for an immediate solution of a conflict of ambivalence. The point is, however, that the psychiatrist by utilizing EST had invited this position in her mind, and that this position is in our experience regularly achieved and comes into evidence in the setting and at the time of transference phenomena of this kind.

Findings in prolonged psychotherapy

It is found, time and again, with different patients in psychotherapy, that the associations of the patient as they crop up in connection with experiences of EST are saturated with anxiety, especially fears of destruction, and ideas concerned with punishment, expiation and making a fresh start. This constellation of thoughts and feelings and of related phantasies occurs in connection with shock therapy in the setting of transference phenomena which point up a revival of threatening and punitive parental figures. Often enough, these are credited too with good intentions.

To amplify this phenomenon of the association of shock therapy (and everything and everyone connected with it) with phantasies of punishment and expiation in the setting of ambivalent transference emotions would require detailed case-reporting so repetitious that the patience of the reader would be too sorely tried. The phantasies of punishment vary con-

siderably in content—purgatory or hell is pictured, castration is adumbrated, or sensations of being helplessly seduced and overwhelmed are conjured. Similarly, in regard to expiation and rebirth, the content is differently clothed from time to time. Sometimes memories of childhood, concerned with a whipping after naughtiness and the subsequent events of finding love restored, are connected with the experiences following shock therapy and the kindness of the physician. The patient may talk about his having found a fresh start after shock therapy, only to follow this with associations derived from a birth phantasy. Sometimes the elucidation of a dream may point up the wish to start again with a clean slate and then connect in the patient's mind with experiences in former shock therapy. Thus when the shock experiences enter into the spontaneous associations of the patient, they are always in a typical nexus of anxiety feelings, notions and memories concerned with punishment, phantasies of expiation and rebirth; and this typical nexus occurs as transference conditions permit.

This indicates that the patient finds the meaning of shock therapy unconsciously (whatever his more proximate conscious attitude) as a punishment which makes him anxious and at the same time diminishes his sense of guilt and offers him the prospect of forgiveness and a fresh start. It should be added that not only is this revealed in detail in psychotherapy, but observations of the behavior of the patient during the course of shock treatment show too that shock therapy induces anxiety, though it is often the correlative defenses which are more obvious, such as fight or attempted flight.

Physiological events, consequent psychic reflections, and the total treatment field

As pointed out in previous papers (1, 2), the meaning of the shock therapy as it later becomes apparent in psychotherapy is hardly surprising in view of the fact that this form of treatment is a means of effecting reversible physiological disruption. Of course, the experience consists of discontinuous and repetitious disruption within a total treatment configuration which includes physicians, nurses, apparatus and the general business of something being done. In other words, the experience of the patient which he carries with him afterwards is compounded of the psychic reflections of this repetitious disruption in a setting of medical care. In a report of a panel discussion by four patients of their reactions to somatic therapy (4), the aversive and anxiety reactions as well as feelings of gratitude are verbalized in a permissive group atmosphere. It is only, however, in lengthy psychotherapy that the unconscious connections of the experience in shock therapy become available for more thorough study.

In psychotherapy, we not only come to understand this essential inner meaning for the patient, but we can also descry its effects. For example again, in the case of the patient mentioned above, the attitude of her father as represented in his weekly compulsory walks aggravated the difficulties this woman experienced in becoming able to relate satisfactorily to men. She suffered from a severe inhibition of spontaneity in the presence of men, for she was frightened of them for reasons altogether outside the realm of her adult conscious understanding before psychotherapy. To isolate an important element from a complicated matter, she had been frightened of her father, and this anxiety engendered a severe ego restriction in her later behavior with men. When the conditions of treatment made it possible for her to discuss this, often enough at the time of discussion she also spoke of the psychiatrist who had previously treated her, and she came to discuss how she had been glad to say she was grateful, and then to make off. She came to recognize the existence of emotions in relation to the shock therapist in the later psychotherapy, which at the time of her actual contact with him made it typically necessary for her to resort to defense in severe inhibition and to present herself simply as a "model patient". He had, it became evident in psychotherapy, put himself in the position of a castigating father-figure with whom she must comply, and from whom she could expect encouragement provided she did. It became clear that the shock therapy enabled her to re-enact a relationship which encompassed not only punishment but also forgiveness, at a time when she was otherwise lost in an internal psychic drama which provided no such bonus; but the therapy was in itself helpless to enable a working through in transference with eventual psychodynamic insight

such as was afforded in intensive psychotherapy. She remained fixed in her ways of relating to others and remained basically a frustrated and resentful woman liable to a renewed attack of severe depression.

The different shock therapies represent a variation upon the same theme, but the variations characteristic of each type of shock therapy are of great importance. The psychic reflections of the organic events as observed in psychotherapy show up the differences as well as the similarities. The fact that these physiological events occur without conscious representation, indeed often in the absence of consciousness, shows that conscious perceptual organization is not necessary for these psychic reflections to occur. Memory is a phenomenon which is only very partially covered by an understanding of the mental processes involved in conscious recall. Just as some psychologists have brought memory theory into relation with instinct theory by means of such concepts as Jung's "racial memories" (14) or Spencer's "inherited organized experience" (17), so we can connect the psychic reflections in psychotherapy with the physiological events which occurred in the absence of consciousness. Besides, ontogenetically bodily experiences register in the psyche before the evolution of ego-organization; bodily experiences are in fact largely responsible for this evolution, and the "body-ego" is the core of the ego-organization.

Thus it happens that the special features of the physiological events which occur during insulin coma treatment show up in the later reaction of the patient in psychotherapy. During insulin coma treatment, hypoglycemia and "tissue hunger" are created as special features of the traumatic situation. Later the associations of the patient are colored by this repetitious bodily experience. Reference to insulin treatment often occurs when the associations of the patient are constellated around events concerned with breast-feeding in infancy and phantasies related thereto. The insulin coma termination is a corrective experience of loving care, and the "symbolic realization" of this when organically regressed to helpless dependence and overwhelming tension is a therapeutic factor of great importance in the treatment of schizophrenic patients.

Previously, one aspect "threat and punishment" has been emphasized, whereas "loving care" has been only barely alluded to. It so happens that it is just in insulin treatment where this latter becomes less overshadowed. The very conditions of insulin treatment require the acting out of considerable care and attention to the patient who, in his turn, is very ready to cast the nurses into the role of nursing mother, feeding him, as they do, when he is helpless and hungry. It seems that this loving care aspect, so emphatic in insulin coma treatment and occurring at a primitive level between patient and nurse, is a very important operative factor in the success of the treatment. Linford Rees in his careful comparative study of the value of insulin coma, electronarcosis, electroshock and leukotomy in the treatment of schizophrenia (16) shows that insulin coma is the most effective, adequately-tested organic therapy of schizophrenia.

As the patient becomes more responsive following insulin coma therapy, a one-to-one relationship with a nurse becomes more effective. In other words, the development of a need-satisfying though otherwise defective object relationship can be cultivated towards a more rewarding one by a person trained in the principles of psychiatric nursing. Relationship therapy under psychiatric supervision can considerably further the corrective experience involved in insulin treatment "mechanically" conducted. Of course, it is already involved in the "mechanics", but by making its presence understood by the nurses, and by utilizing it more fully, the efficacy of insulin therapy can be markedly improved. It is probable that the differential response of depressives and schizophrenics, the one category more rapidly to EST and the other more fully to insulin coma treatment, is related to such factors as the ratio of "threat and punishment" to "loving care" implied in the procedures, respectively. Of course, there are so called schizo-affective disorders, and in such cases combination therapy can alter the ratio of these elements involved in the mechanical procedures. In all cases, more understanding of the patient is required to enable more effective relationship therapy by the nurses, and more effective psychotherapy by the physician.

There are many subsidiary therapeutic factors involved in shock therapy, one of which

has been emphasized by Flescher (8). This is the discharge of tension involved, for example, as in the convulsion itself in EST. The periodic discharge of tension, which itself is largely the result of frustration and rage, leaves the patient often more composed and accessible. This would not persist long—the tension would, of course, build up again rapidly—were it not for the mobilization of defenses and stimulation of ego-organization which results from exposure to shock therapy.

Part II—The Attitudes of Shock Therapists

Modern trends of thought regard all physician-patient relationships as worthy of study, but it is in psychiatry that emphasis on the interpersonal relationship has assumed greatest importance. In any dynamic psychotherapeutic relationship there must be awareness of countertransference on the part of the therapist. Feelings and defenses of the therapist which may interfere with the treatment process require recognition and clarification for their control or deletion. Unfortunately, there has been inadequate consideration of this factor in all the physical methods of therapy including the shock therapies and the use of modern "wonder drugs". A fuller understanding of this aspect of the physical therapies may enable them to be used more effectively. In addition we may gain further clues concerning the controversial question of the mode of action of these therapies.

Fenichel (6) states that, in personal experience in analyzing doctors who apply shock treatment, "The (conscious or unconscious) attitude of the doctors toward the treatment was regularly that of 'killing and bringing alive again,' which idea, of course, provoked different emotions in different personalities. It may be that the impression the treatment gives to the doctors corresponds to an impression it gives to the patients. It seems that they, too, experience a kind of death and rebirth."

Wayne (18) has recently drawn attention to the fact that the characteristics of a method of treatment can unconsciously evoke responses in a doctor which may be obscure to him. The use or avoidance of the method itself may be motivated, at least in part, by these same obscure responses. He lists the characteristics of electroconvulsive therapy (EST), pointing out how the unconsciousness, seizure and coma show all the characteristics of an overwhelming assault. Wayne then discusses the unconscious constellations which may inaugurate a decision to use EST or lead to an emotionally toned prejudice against its use. He cites the case of a physician who suffered back pain on the days he had administered EST. Analysis revealed guilt over unconscious hostility toward the sick patients.

We realize the potential pitfalls were we merely to question shock therapists concerning their feelings. Another approach, therefore, is to consider the statements made by psychiatric colleagues in their "off guard" moments. Psychiatrists discussing shock therapies with with relatives of patients are often very guarded in their remarks. Even though they are usually very frank about the possible physical effects of this treatment, one feels that they are carefully weighing their words concerning the psychological implications. In marked contrast are the casual, often lighthearted comments of the shock therapist before his professional colleagues. Remarks made at such times will tend more nearly to reflect feelings and attitudes of the shock therapist than might be obtained by any other method short of psychoanalysis. One of us (J. A. E.) has collected these statements over a period of eight years in Britain and the United States. Most of them have been heard on many occasions. Colleagues who have seen the list of comments have confirmed our findings that many affect-laden colloquialisms are regularly used by shock therapists in referring to their therapy. Undoubtedly the following list could be lengthened, but only personally collected remarks are used, and only remarks uttered by experienced shock therapists who would seem to have had time enough to develop fairly consistent attitudes. The feelings of the resident in psychiatry are, we believe, often quite confused when he first becomes involved with shock therapy. The statements listed were made by 19 shock therapists out of a possible total of 25. Numbers 1 through 8 and 12 and 14 were heard (with minor variations) from three or more therapists on independent occasions. Numbers 10, 11 and 13 were heard twice each.

It is important to point out that many shock therapists (including some of those whose re-

marks are cited below) have denied any particular feeling about shock therapy when directly questioned. Even the suggestion that statements such as "Hit him with all we've got" are not used without significance is met with strong protests from some therapists. Thus, it seems very probable to us that the insistence of some workers upon exclusively physical explanations represents a defense against unacceptable unconscious feelings.

Statements of shock therapists in USA and Britain

1. "Let's give him the works."
2. "Hit him with all we've got."
3. "Why don't you throw the book at him?"
4. "Knock him out with EST."
5. "Let's see if a few shocks will knock him out of it."
6. "Why don't you put him on the assembly line?" (This comment has been heard in a hospital where the assembly line technique was indeed used to cope with large numbers of patients on shock therapy. The implied lack of awareness of any interpersonal relationship between therapist and patient is very obvious.)
7. "If he would not get better with one course, give him a double-sized course now."
8. "The patient was noisy and resistive so I put him on intensive EST three times a day."
9. Recently one of us was consulted by the husband of a woman alcoholic as he had been advised by a psychiatrist to let her have EST. The psychiatrist had explained the procedure to the husband and had given his opinion that it would prove beneficial to the patient by virtue of its effect as "A mental spanking."
10. "I'm going to gas him."
11. "Why don't you give him the gas?"
12. "I spend my entire mornings looking after the insulin therapy patients."
13. "I take my insulin therapy patients to the doors of death, and when they are knocking on the doors, I snatch them back."
14. "She's too nice a patient for us to give her EST."

The first 9 of the above statements were made about EST. Clearly, the main attitudes expressed are those of hostility and punishment. In marked contrast are the remarks about insulin therapy. Here we observe that the idea of a threat is overshadowed by the concept of rescue of the patient from destruction. Number 13 above refers to the theme of death and rebirth, with the therapist more emphatically in the role of the "good" figure who saves the patient's life. Statements such as number 14 are usually spoken in jest, but behind the words used we can detect the therapist's reaction against the sadistic implication of shock therapy.

Our experience in the observation of CO_2 therapy has been limited, but here again in remarks numbers 10 and 11 we may suspect a hostile, punishing attitude. CO_2 therapy has been in use for much less time than EST, and possibly the use of colloquial terms to represent CO_2 will yet develop. More often we have heard therapists refer to CO_2 therapy in terms of assumed action, e.g., "Let's give her CO_2 to help her express her hostility." It is not our intention to discuss the possible modes of action of CO_2. However, we have observed equally violent abreactions following experimental work with nitrogen inhalations in psychiatric patients. The lack of a full amnesia in association with the gassing or choking "attack" of the therapist might well provoke expression of hostility in the patient irrespective of any physiological effect of the gas used. In observing CO_2 therapy, it has seemed that the least excited and aggressive reactions occur in depressed patients who appeared to "take their punishment lying down."

While many workers with CO_2 therapy have tended to study only the pharmacological effects of the gas, the psychological meaning of its use was investigated by Hargrove *et al.* (12). They concluded (in part), "The use of carbon dioxide therapy in our hands added no specific therapeutic effect but did add problems of transference and resistance that retarded or prevented therapy." These findings were confirmed by Freedman (9) who concluded that the reactions of each patient followed the transference reactions to the therapist administering the treatment. He noted also that in the CO_2 treatment situation there seemed to be intensification of the transference reactions even on relatively brief contact between therapist and patient.

There is another situation in shock therapy which, though frequent, has received little at-

tention. In certain clinics and state hospitals where large numbers of patients are treated, the shock therapist may be a stranger to the patient. While it may be desirable for the psychiatrist to be present at the somatic treatment of his patient, this is not always possible. Here then we have a situation which is worthy of investigation. There is a need for studies to compare and contrast the results, and the transference and countertransference reactions, in various somatic therapies given by the patient's own therapist on the one hand and by a strange shock therapist on the other. Of course, the patient's therapist is the responsible decision maker, and he may seem to be the punisher by proxy in some instances; however, it has happened at times that the transference reactions of the patient to the two therapists have differed.

Nurses and attendants are not only auxiliaries of the shock therapist in the actual shock treatment session, but are more intimately and continuously in contact with the patient. Scrutiny of the reactions of nurses and attendants to their participation in somatic therapies should also be rewarding, but spontaneous "off-guard" expressions have not been sufficiently available to us. It is, of course, the frequent experience of a physician in a state hospital to be approached by a nurse who suggests a "few shocks" for a patient because he has been fighting, resistive, uncooperative or even merely obscene in his talk. In one hospital which employed a large number of relatively untrained personnel, it was clear that such members of the staff used EST as a threat. Even non-psychotic voluntary patients reported threats of "You will go on the shock list" for such lack of cooperation as disinclination to eat a full meal! Certainly such openly threatening remarks are usually confined to the least understanding and most junior attendants who are enjoying a newfound sense of power. This is sometimes connected with an unconscious participation in the "omnipotence" of the shock therapist.

Discussion

The most interesting feature about the remarks listed is that all those which display hostile or punishment attitudes refer to the briefer forms of therapy. These, of course, are dramatic therapies and involve much action. They also bring the therapist into a much shorter contact with the patient.

In marked contrast are the prolonged care and watching over the patient during many hours of insulin therapy.

Electroshock and insulin therapy actually engender different attitudes in the therapist by virtue of the mechanisms and techniques involved. In the case of the latter there is prolonged display of the "tender loving care" about which Abse has written (2).

In talking about the hostile, attacking nature of EST with shock therapists, we have noticed that some assume they are being accused of sadistic intentions. Such is far from the case. Instead, we wish to stress again that *the very nature of the treatment itself can produce the attitudes described.*

The success of EST principally in depressions is thus associated with hostile or punishing attitudes on the part of the therapist which correspond with the impressions received by the patients. It seems probable therefore that even the most organically minded shock therapist unconsciously allies himself with the punitive super-ego of the depressed patient.

In insulin therapy, we can be sure that the schizophrenic's well-known sensitivity to the attitudes of others makes him aware of the element of tender loving care to which the treatment lends itself.

A statement uttered by Freud in 1904 (10) is worth repeating here: "All physicians, therefore, yourselves included, are continually practising psychotherapy, even when you have no intention of doing so and are not aware of it; it is disadvantageous, however, to leave entirely in the hands of the patient what the mental factor in your treatment of him shall be. In this way it is uncontrollable; it can neither be measured nor intensified. Is it not then a justifiable endeavor on the part of a physician to seek to control this factor, to use it with a purpose, and to direct and strengthen it?"

This is a suitable place to suggest our need also to examine the psychological implications of the latest type of somatic therapy—the use of the drugs called tranquilizing agents. Undoubtedly these drugs have turned attention and interest toward the chronic psychiatric patient. Many thousands of "back ward" patients in state hospitals can now feel that

"something is being done." In many instances these patients are being observed as never before. The enthusiastic drug therapist looks for signs of improvement in his patients and, in so doing, offers an interpersonal relationship that has often been lacking. Nurses and physicians react in a more positive and loving way towards the "tranquilized" patient. These and many other such factors must be kept in mind because we cannot investigate such therapeutic tools from a purely pharmacological viewpoint.

The whole question of countertransference in medicine generally has been considered by Lewin (15). The medical student's first "patient" is a cadaver. "His relationship to the cadaver is an outlet for many sublimated, active, libidinal drives, as well as those of mastery and power. Intended to be a prototype of all future patients in certain rational respects, the cadaver easily comes to be the student's ideal of a patient in all respects." Lewin goes on to point out the unconscious knowledge of doctors that sick people are aggressive, either to the environment or to themselves. Counter-aggression on the part of the doctor has to be sublimated. For example, the doctor will use drugs which would be poisonous in non-therapeutic doses; he may use morphine for a severe pain and thus reduce his patient to the state of a cadaver. Occasionally in years gone by, we have seen or heard of whole wards of chronic psychiatric patients being kept relatively orderly and subdued by the use of the older sedatives. Such occurrences can be understood in terms of Lewin's interpretations. It seems clear that such excessive medication is the end result of countertransference feelings in the nurses and physicians.

Lewin's original paper deserves study by all psychiatrists who are using the latest drugs which have, as yet, none of the unfortunate associations of the older sedatives such as suicides and addictions. While we investigate these drugs from pharmacological, physiological and psychological points of view, we would do well also to elucidate countertransference meanings.

Demands from relatives of patients are well known to psychiatrists in relation to shock therapies as well as to the new drugs. A study of the unconscious attitudes of relatives of shocked patients might well be revealing. Meanwhile, many of us will agree with Arieti (3) when he says, "The drastic nature of shock treatment often acts as a catalyst on the emotional attitude of the relatives toward the patient."

Summary

The mode of action of the somatic therapies can be investigated from the psychological viewpoint as well as approached through physiological studies. Psychological studies seem to be most useful when unconscious transference and countertransference reactions in the physician-patient relationship are scrutinized.

Prolonged intensive psychotherapy with patients who have had shock therapy shows that unconscious defensive reactions were aroused *vis-a-vis* the shock therapist and his assistants at the time of treatment. It is upon the arousal of such defenses as well as the support the patient feels in the total treatment configuration that the efficacy of shock therapy largely depends. It is important to realize that there are crucial psychodynamic events involved in the organic therapy of a functional psychosis; these need further elucidation through research in the psychotherapeutic process. This conclusion reached through study of patients previously treated by shock methods may well also apply to those treated by drugs.

Concerning the countertransference aspects, it is concluded that the briefer therapies lend themselves to the development of hostile, punitive attitudes, whereas a therapy such as insulin therapy engenders a more loving and caring attitude on the part of the therapist. These attitudes are displayed in the casual "off-guard" remarks made by shock therapists, some examples of which are listed. It is emphasized that there is as great a need for awareness of countertransference in the physical therapies as in psychotherapy. This awareness should lead to fuller understanding of the psychological implications of these therapies and to their more effective use.

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THE RORSCHACH REACTION PATTERNS OF MATERNALLY OVERPROTECTED AND MATERNALLY REJECTED SCHIZOPHRENIC PATIENTS[1]

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While various concepts have influenced the formulations, and numerous attempts have been made to investigate the heterogenous behavior complexes and reactions in schizophrenia, controversy still exists as to whether it is constitutionally or functionally determined. Not only is the clinical symptomatology variable, but detailed psychological studies investigating mental functioning, personality structure and diagnostic reactions pathognomonic of the illness lack consistency in their findings.

As a result of more recent formulations of schizophrenia which view the individual as a social being influenced in his development and reactions by all the environmental forces which act on him, much has been written about the nature of the parent-child relationship and the family background of schizophrenic patients (5, 7, 10, 15). There have been investigations too, which have shown a correspondence between specific personality characteristics and methods of parental handling of the child (2, 11, 12, 18). However, little controlled experimentation has been carried out with adult schizophrenic patients to confirm clinical impressions and to demonstrate the absence or presence of a connection between specific pathological reactions and early parent-child relationships.

THE PROBLEM

Since, as Lewis (9) points out, "the actual behavior, hallucinatory and delusional formations are constructed out of the personality and life problems of the individual", there should be significant differences in the reaction patterns of schizophrenics who in childhood were reared in different maternal environments.

This investigation was thus devoted to the purpose of studying the personality characteristics and reaction patterns, as expressed through their Rorschach perceptanalytic performance, of a group of 25 maternally overprotected schizophrenic patients and a group of 25 maternally rejected schizophrenic patients.

Reactions or reaction patterns are operationally defined, as used in this study, and relate to specific Rorschach variables and their meaning in terms of personality and behavioral characteristics. In order to differentiate the operationally defined tendencies, the following assumptions were applied.

In terms of energy capacity and energy control, as used by Piotrowski (14), the weaker the inner life in comparison to the affective life (more color than human movement responses), and the weaker the control over the impulses (few light shading; more color than light shading responses), the more restless the motility and the greater the tendency to acting-out behavior. On the other hand, the weaker the affective drive (few color responses), the greater the inhibition over the impulses (many light shading; light shading more than color responses), the weaker the drive (few whole responses) and the more self-absorbed the individual is (many human movement; more movement than color), the weaker would be the urge to live in the world outside oneself and the greater the experienced feelings of frustration, emotional ambivalence and the stronger the tendency to ideational symptomatology.

The population consisted of 50 white, male adult patients who had been psychiatrically diagnosed as schizophrenic. The patients were culled from two psychiatric hospitals in New York State and had no history of previous hospitalizations or earlier, overt psychotic breaks, or exposure to any form of therapy prior to hospitalization, or familiarity with the Rorschach test.

The patients ranged in age from 20 to 40 years, had at least a high school education and were of average intelligence or better, as measured by their Wechsler-Bellevue test performance.

The admission files at both hospitals were

[1] Condensation of thesis submitted in partial fulfillment for the Ph.D. degree at New York University, School of Education, May, 1955.

checked for male patients who had been diagnosed as either schizophrenic or dementia praecox and who met the age and education requirements. The case histories were obtained from the wards and evaluated according to specific criteria for maternal overprotection and rejection. The cases who met the criteria for being clearly categorized were collected serially and separated into two groups, each consisting of 25 patients, depending on the nature of the mother-son relationship.

The nature of the mother-son relationship was determined according to Levy's (8) and Symonds' (16) criteria for maternal overprotection and rejection. Doll's (3) and Gesell's (6) developmental norms were utilized in the evaluation of behavior which would infantilize the child and interfere with the development of independent behavior. The following are the specific criteria for maternal overprotection:

A wanted child

Infantilization:

Prolonged breast (12 months or more) or bottle (past 2½ years) feeding;
Excessive contact as manifested by overfondling and performing activities in the care of the child beyond the time when such activities occur normally, such as prolonged feeding of the child (past 5 years); dressing the child (past 5 years); bathing the child (past 7 years);

Prevention of social maturity and independent behavior:

The child cannot undergo risks customary to the group to which he belongs as indicated by overprecautionary measures regarding health and cleanliness; isolation from other children (past the school age); and/or continuous companionship as reflected in close supervision or monopoly over play activities with his friends and over his school activities;

Discipline:

Excessive maternal control and domination by the mother to which the child conformed because of her overstrict and exacting attitudes.

The following are the specific criteria for overt maternal rejection:

An unwanted child

Denial of the child:

This would be indicated by the mother's lack of desire to nurse the child or by the early and unnecessary discontinuation of breast feeding (before 4 months);

Neglect:

This would be indicated by early separation from the child as by placing him with others whenever possible; by leaving the child to his own devices; displaying a lack of interest in his friends, school activities, recreation and eating habits;

Humiliation of the child:

This would be indicated by ridicule and/or criticism and unfavorable comparisons to siblings and other children;

Discipline:

Excessive spankings and use of physical force to control the child; continual scolding, nagging and threats in an attempt to maintain discipline.

In evaluating the case histories, cases were utilized only when all the criteria were met, if the psychiatrist obtaining the history felt that the information was reliable, where there was agreement between his history and that obtained by the social service worker on the case, and where the credibility of the information could be further checked on the basis of concrete examples produced by the patient during his interviews with his psychiatrist.

The Wechsler-Bellevue Test was administered to each patient after he had been clearly categorized in terms of the maternal environment. The overprotected patients as a group were four years older (mean C.A. 28.04 years) than the rejected group (mean C.A. 24.04 years), and both groups were classified as being of better than average intelligence, in terms of mean I.Q. The two groups were rather closely equated intellectually, with the overprotected group having a mean I.Q. of 120.32 (S.D.10.75) and the rejected group a mean I.Q. of 118.84 (S.D. 10.16).

After the two groups of patients were selected and given the Wechsler-Bellevue Test, an individual Rorschach was administered to each patient. The Rorschach protocols were scored according to the Piotrowski method (13) and according to Beck's (1) location areas, quality of form responses, and popular responses.

Analysis and Treatment of Data

Each Rorschach protocol was scored, and the data summarized and profiled according to the following variables:

a) R (productivity or total number of responses)
b) W, D, d, S (location areas)

c) M (human movement), FM (animal movement), m (inanimate movement)
d) F% (the per cent of form responses)
e) F plus % (the quality of the form responses—F, Fc, Fc′)
f) Sum of light shading (c) and dark shading (c′). In calculating the sum of c (and c′) the following weights were used: Fc-1; c-1½; for every one or two c used as a secondary determinant (i.e., Mc, FMc), the value was ½.
g) Sum of C (FC, CF, C). In calculating the sum of C, the following weights were used: FC-½; CF-1; C-1½; C as secondary determinant (i.e., MC, FMC), a weight of 1.
h) R (VIII-X)/R (the per cent of color responses to the last three plates)
i) A and Ad% (animal and animal detail responses)
j) H% (human responses)
k) P (popular responses)
l) Int. RT (initial reaction times)
m) Card rejections

While each Rorschach symbol has its own nuclear meaning, in evaluating a protocol, the relationship of each determinant to the whole gives it its significance. The relationships between the following Rorschach components were thus tabulated:

a) M:C (fantasy living as compared to emotional living)
b) C:c (emotional life versus control over the impulses)
c) W:M (intellectual strivings and drive versus fantasy living)
d) M:FM (inner maturity versus immaturity)

The individual analysis of the content of certain responses was also done. The human movement responses (M), the areas into which they were projected (W,D,d) and content pertaining to humans (H) as well as the quality of the animal movement (FM) responses were classified as follows, and tabulated:

1. Human and animal movement responses:
   a) Passive or flexor movement (included all movement in which no overt activity was taking place, such as standing, peering, looking, smiling, as well as the usual bending, sitting and resting)
   b) Assertive or extensor movement (included responses such as dancing, flying, walking, eating, sucking on a straw, laughing aloud, blowing a horn, talking, leaping)
   c) Combative movement (included responses such as fighting, kicking, arguing and other aggressive content such as preying or stalking animals, rivalry or competitive concepts)
   d) Blocked or frozen movement (included tug of war concepts and animals or people poised or about to do something, or an activity that has just been halted)
   e) Cooperative and friendly movement (included responses such as people or animals doing something together, like carrying a common burden, kissing each other, rubbing noses together in a friendly fashion)
   f) Mixed flexor and extensor movement (included such concepts as bending down to lift something, bending down to beat on a drum, people sitting down and talking, lying on the floor doing stretching exercises)
2. Human movement projected into:
   a) Male figures
   b) Female figures
   c) Unreal human figures (such as elves, gnomes, giants, ogres, men from Mars, witches, cartoon figures, caricatures, mixed animal and human characteristics)
   d) Animal figures
   e) Mixed figures (ambiguous in terms of sexual characteristics)
3. Human movement projected into:
   a) Whole human figures
   b) Parts of human figures
4. Human movement projected into:
   a) The whole (W) blot
   b) Large details (D)
   c) small or unusual details (d)
5. Human responses:
   a) Male
   b) Female
   c) Ambiguous (characteristics of male and female; lack of clarity as to whether male or female; embryos)
   d) Mythological or unreal human figures
   e) Cartoon and caricature figures
   f) Mixed animal and human characteristics

Content pertaining to sexual responses were also classified as follows and tabulated:

1. Overt sexual content:
   a) Male genitalia
   b) Female genitalia
   c) Anal percepts
   d) Percepts pertaining to intercourse
   e) Nude figures
2. Disguised or evasive sexual content:
   a) Pelvic bone percepts
   b) X-ray or anatomical percepts of lower portion of the body
   c) Percepts pertaining to legs and feet
   d) Clothing responses such as brassiere, pants, shorts, skirts
3. Shock reaction to Plate VI:
   a) Rejection
   b) Sudden blocking of ideas as indicated by in-

creased initial reaction time (i.e., 10 seconds or more above the average initial reaction time)

The color responses were also treated in terms of content.

1. Earthy color:
   a) Blood
   b) Sex
   c) Fire
   d) Food
   e) Anatomy
2. Superficial color:
   a) Plant and nature scenes
   b) Designs and art

The data for each group were treated in terms of absolute numbers and percentages. The statistics were designed to determine whether there were significant differences between the two groups for each of the variables. When a variable occurred very infrequently, the X^2 method was used to determine whether it occurred with different frequency in the overprotected and rejected groups. Otherwise, the means, standard deviations and t-test for the significance of the difference between the means for both groups were calculated. Each ratio was treated at least two ways to deter-

TABLE 1.—Comparison of the Overprotected and Rejected Groups: R, Location Areas, Populars, Animal and Human % and Average Reaction Times

Rorschach Variable	Overprotected Means, %	Rejected Means, %	t or X^2
Total R	43.48	23.88	t 5.272***
Total W (W, WS, DW)	5.44	9.28	t 3.848***
% Total W	16.92%	46.84%	t 5.064***
Number of W	4.56	7.44	t 3.247***
% present WS	44%	68%	X^2 2.922
% present DW	24%	28%	X^2 .104
Total D (D, DS)	28.52	12.44	t 3.831***
% Total D	67.44%	48.08%	t 3.593***
Number of D	25.96	12.28	t 3.524***
Number of DS	2.56	0.88	t 2.710**
Total d (d, ds)	8.56	1.24	t 8.234***
% Total d	14.04%	4.00%	t 3.543***
Number of d	7.84	1.16	t 2.889**
% present d	80%	36%	X^2 9.934**
% present ds	44%	8%	X^2 8.420**
% present S	32%	25%	X^2 .936
Sum of all S	4.84	2.64	t .991
% Total S	10.64%	13.04%	t .626
Total d, ds, S	9.56	1.44	t 2.967**
% Total d, ds, S	15.64%	4.84%	t 3.407**
Total Popular	5.76	5.08	t 1.066
% Popular	16.68%	23.36%	t 2.739**
% Animal (A, AD)	45.56%	51.44%	t 1.227
% Human (H)	6.16%	7.00%	t .421
Average RT (sec.)	18.16″	18.32″	t .046
RT Colored plates	18.20″	16.36″	t .555
RT Achromatic plates	18.00″	20.32″	t .610
RT Plates VIII–X	20.60″	17.96″	t .632

t-test: *P .05 (t-2.010); **P .01 (t-2.681); ***P .001 (t-3.506).
X^2: *P .05 (X^2-3.84); **P .01 (X^2-6.64); ***P .001 (X^2-10.83).

mine if there was a significant difference between the overprotected and rejected groups. Differences were considered significant if they fell at the five per cent level of confidence or better.

The means, per cents, per cent present, t-test and Chi-square values for Rorschach variables relating to the total number of responses, location areas, populars, animal and human responses and average initial reaction times are presented in table 1.

Comparisons between the overprotected and rejected groups in regard to Rorschach determinants relating to movement (M, FM, m), light and dark shading (c, c′), color (sum of C, FC, CF, C), form (F) and their quality (F + %) and per cent of responses to the last three plates (R(VIII–X)/R) will be found in table 2.

Comparisons between the overprotected and rejected groups in regard to data obtained through the individual analysis of the quality of the human (M) and animal (FM) movement responses, and the areas and types of figures into which M was projected, will be presented in table 3.

Comparisons between the two groups in relation to the data regarding the quality of the color responses (earthy and superficial), the sex responses (overt and disguised) and the kinds of human figures perceived are presented in table 4.

Data for both groups pertaining to the

TABLE 2.—Comparison of the Overprotected and Rejected Groups: Movement, Shading, Color, Form and Per Cent of Responses to Plates VIII–X

Rorschach Variable	Overprotected Means, %	Rejected Means, %	t or X^2
Total M (M, MC)	5.36	2.08	t 3.188**
% Total M	12.32%	8.20%	t 1.895
Number of M	4.36	1.76	t 3.282**
% present MC	28%	20%	X^2 .439
% present M−, MC−	76%	36%	X^2 8.117**
Total FM (FM, FMC)	5.56	4.44	t 1.241
% Total FM	14.56%	20.00%	t 1.716
Number of FM	5.08	3.44	t 1.955
% present FMC	36%	56%	X^2 2.013
% present FM−, FMC−	72%	68%	X^2 .095
% present m	48%	20%	X^2 4.367*
Total c (Fc, c)	6.26	1.80	t 3.355**
% Total c	13.04%	6.36%	t 3.648***
Total c′ (Fc′, c′)	1.44	1.18	t .643
% Total c′	2.96%	5.24%	t 1.770
Total Sum C (FC, CF, C)	3.88	5.78	t 1.729
% Total C	8.48%	23.44%	t 5.868***
Number of FC	1.56	0.92	t 1.133
% FC	3.88%	3.20%	t .561
Number of CF	1.96	3.40	t 2.090*
% CF	3.84%	13.28%	t 4.818***
% present C	16%	28%	X^2 1.049
% C	0.40%	1.84%	t 2.117
F%	49.40%	41.92%	t 1.567
F plus %	60.96%	53.28%	t 1.137
% R pl. VIII–X	38.56%	37.72%	t .289

TABLE 3.—Comparison of the Overprotected and Rejected Groups: Quality of Human and Animal Movement Responses, Areas and Types of Figures into Which Human Movement is Projected

Rorschach Variable	Overprotected Means, %	Rejected Means, %	t or X^2
Assertive M	68%	32%	X^2 6.480*
Passive M	76%	36%	X^2 8.117**
Combative M	28%	4%	X^2 5.357*
Cooperative M	20%	12%	X^2 .595
Blocked M	20%	16%	X^2 .136
Mixed M	32%	32%	X^2 .000
Assertive FM	2.92	1.60	t 1.694
Passive FM	72%	52%	X^2 2.122
Combative FM	36%	32%	X^2 .089
Cooperative FM	32%	20%	X^2 .936
Blocked FM	25%	48%	X^2 4.367*
Mixed FM	20%	32%	X^2 .936
M in W	1.32	1.60	t .848
M in D	96%	24%	X^2 27.000***
M in d	28%	4%	X^2 5.357*
M in whole figure	2.68	1.80	t 1.406
M in part of figure	76%	25%	X^2 15.705***
M in male figures	1.68	1.04	t 1.362
M in female figures	56%	25%	X^2 6.876**
M in animal figures	25%	8%	X^2 1.495
M in unreal figures	60%	28%	X^2 5.195*
M in mixed figures	36%	12%	X^2 3.947*

relationship between Rorschach components (W:M, M:C, C:c, M:FM) are presented in table 5.

Interpretation and Discussion

The overprotected schizophrenic group

The statistical data indicate that the overprotected group gives significantly more responses (R) and, in its approach, emphasizes D and DS, and d and ds areas, neglecting W (table 1). It uses more M responses in terms of absolute numbers, but they are poorly perceived (M−, MC−), and the human movement responses are more frequently projected into parts of human figures, rather than into whole human figures, and in D and d areas rather than in W areas (tables 2 and 3).

Insofar as the quality of the M is concerned, the group produces significantly more assertive, passive and combative types of movement, and the M's are more frequently projected into female, ambiguous (in terms of sexual characteristics) and unreal figures (table 3).

The group uses m percepts more frequently (table 2), though it does not differ significantly from the rejected group in the use of FM responses or in the quality of the animal movements, except that the rejected group uses blocked FM more frequently (table 3).

While the overprotected group does not use more C in terms of absolute numbers than the rejected group, the difference is significant when the data are treated in terms of per cent (table 2). This is understandable in view of the greater productivity of the overprotected patients. The significance of C is much more meaningful when treated in its relationships to M and c. In regard to the M:C relationship, the overprotected group differs significantly from the rejected group in that the relationship is an ambiequal one or that the ratio is weighted on the M side; that is, they use more M than C (table 5).

Not only do the overprotected patients use significantly more c than the rejected patients (table 2), but the group uses more c than C or enough shading to balance color, which is the reverse of the ratio in the rejected group (table 5).

In regard to the content, the differences

TABLE 4.—COMPARISON OF THE OVERPROTECTED AND REJECTED GROUPS: QUALITY OF COLOR, SEX AND HUMAN RESPONSES

Rorschach Variable	Overprotected Means, %	Rejected Means, %	t or X^2
No. Earthy color	1.52	2.16	t 1.103
% Earthy color	3.28%	7.80%	t 3.079**
No. Superficial color	1.32	2.48	t 1.955
% Superficial color	2.92%	11.24%	t 4.669**
% present Blood	20%	28%	X^2 .439
% present Sex	24%	25%	X^2 .168
% present Fire	10%	4%	X^2 1.495
% present Food	16%	32%	X^2 1.754
% present Anatomy	32%	44%	X^2 .764
No. Plant and Nature	1.28	2.20	t 1.970
% present Designs, Art	16%	28%	X^2 1.049
Total Overt Sex	2.84	0.96	t 1.770
% Overt Sex	5.04%	3.16%	t .934
Total Disguised Sex	2.20	1.04	t 2.427*
% Disguised Sex	5.92	4.36%	t .988
Overt Sex (% present)			
Female genitalia	28%	20%	X^2 .439
Male genitalia	36%	24%	X^2 .857
Anal responses	20%	8%	X^2 1.495
Intercourse responses	12%	8%	X^2 .222
Nude figures	20%	4%	X^2 3.030
Disguised Sex (% present)			
Pelvic areas	40%	12%	X^2 5.094*
X-rays	16%	8%	X^2 .758
Legs and feet	60%	20%	X^2 8.333**
Clothing	24%	16%	X^2 .500
VI rejection	0%	4%	X^2 0
VI shock, RT	20%	24%	X^2 .168
Human Responses			
% Male figures	5.32%	5.24%	t .044
% present Female figures	60%	28%	X^2 5.195*
% present Ambiguous fig.	56%	40%	X^2 1.282
% present Unreal figures	64%	24%	X^2 8.177**
% present Caricatures	20%	20%	X^2 0
% present Mixed figures	36%	28%	X^2 .368

which can be considered significant are that the overprotected patients use a lower percentage of P (popular) responses, though not significantly different from the rejected group when the difference is considered in terms of absolute number (table 1), more frequently project female and unreal human figures and give more disguised sex responses (table 4). The latter is especially evident in the per cent present of pelvic area percepts and in the use of leg and feet responses. The larger number of disguised sex responses given, however, seems to be a function of total productivity rather than to a greater preoccupation with sexual matters since the significance is lost when the two groups are compared in terms of mean per cents. The lower per cent of P can also be related to the greater productivity in the overprotected group.

The W:M relationship is significantly different in the overprotected group with the patients using more M in proportion to W, rather

TABLE 5.—THE OVERPROTECTED AND REJECTED SCHIZOPHRENIC GROUPS: RELATIONSHIPS BETWEEN W:M, M:C, C:c AND M:FM RATIOS

Rorschach Variable	Over-protected Group	Rejected Group	t or X^2
W:M > 3:1	12%	72%	X^2 18.467***
M = ΣC or M > ΣC	76%	8%	X^2 23.727***
ΣC > Σc	20%	92%	X^2 26.297***
M = FM or M > FM	45%	25%	X^2 1.587
$\frac{M + .5}{W + .5} \times 100$	110.52	29.60	t 4.088***
$\frac{M + .5}{\Sigma C + .5} \times 100$	213.88	40.00	t 3.323***
$\frac{\Sigma C + .5}{\Sigma c + .5} \times 100$	0.73	4.50	t 4.537***
$\frac{M}{FM + M} \times 100$	46.08	29.72	t 2.514*

than more W in proportion to M, as found in the rejected group (table 5).

The M:FM relationship in the overprotected group does not differ significantly from the one found in the rejected group. The overprotected group does, however, produce a greater total of movement responses (M plus FM) than do the rejected patients (table 5).

In terms of personality characteristics and behavior reactions the following interpretations are suggested for the overprotected patients:

1) The overprotected patients' greater productivity may be considered to reflect the group's obsessiveness and autism. The group, however, seems to dissipate its energy or activity in an unorganized manner (few W in relation to R; many d). The patients become embroiled with non-essentials which do not complement one another, making little attempt to discipline their thinking or plan ahead to distant goals. They may keep busy, but they create nothing significant. The overemphasis on non-essentials can be considered to possibly indicate anxiety-relieving habits of an obsessive nature.

2) Their unrealistic approach to the world about them and their ideational and thinking disturbances are reflected in the autistic quality of their fantasies (M−) and in their generally distorted and original perceptions (F plus per cent).

3) They are more influenced by their own ideas about the world and their role in it, rather than by environmental or emotional stimuli (more M than C). As a group, the patients are inclined to be more introspective and probably much more aware of their personality difficulties (m).

4) Since they are so self-absorbed, they would tend to realize their conceptions of role in life chiefly in fantasy (few W, many M in relation to W), spending a good deal of time daydreaming about concepts of role which are considered desirable but at the same time unattainable and which affect their actual conduct but little (M in d, m responses). Their obsessive ambivalence or indecisiveness over their conception of role in life is also reflected in the variable quality of their human movement responses (assertive, passive, combative).

5) They have not been able to evolve a self-concept or establish an adequate identification with members of their own sex, with their identification being an essentially feminine one (higher percentage of female figures). Their sexual role is a confused or unclear one (human figures with ambiguous sexual characteristics), and they seem to suffer from feelings of depersonalization (projection of unreal human figures). Though they are interested in others and desirous of being accepted (c), at the same time their attitudes toward people are peculiar and reflect their own lack of integration and feelings of estrangement from others and reality (M in parts of human figures).

6) While these patients have definite feelings and emotions which can be viewed as manifestations of impulsiveness and potential activity, they are, at the same time, unable to release their feelings or act in a spontaneous manner (c more than C). The inability to release their feelings and impulses only serves to intensify their inner feelings of tension and emotional turmoil, and they feel excessively anxious, uncertain and threatened by, or oversensitive to potential dangers (many c). While they try to cling to the protection which they believe they can gain from the environment, even at the expense of sacrificing part of their own personality, their defenses are too inadequate (minus

percepts) to decrease their feelings of insecurity in regard to the potentially dangerous environment.

In relating the present findings to what has been written on the role of overprotection, the concensus of opinion according to a survey of the literature is that the main expression of overprotection is the child's failure to grow up. Some of the characteristics shown by the child's response to overprotection are summarized by Symonds. He writes that the overprotected child is dependent and helpless, is unable to accept responsibility, has poor work habits, is unable to adapt socially, is inclined to be withdrawn and seclusive and can develop schizoid tendencies, is submissive or docile and suffers from intense feelings of insecurity, inferiority, inadequacy and anxiety or apprehension.

More specifically in terms of the schizophrenic patient, investigators have stressed the patient's inability to attain maturity, or meet even the minimal demands of adult life, thus being forced to retreat into fantasy, and their inability to develop an outlet for their aggressive impulses. There has been emphasis as well on the relation between maternal overprotection and its role in hindering psychosexual development.

The findings in the present research would seem to bear out many of the reported clinical observations and speculations regarding the role of overprotection and the nature of the schizophrenic reactions.

In the present investigation, one of the most outstanding differences between the overprotected and rejected schizophrenics is in the use of c or light shading responses with the overprotected patients using significantly more c. Not only is c considered to be a measure of control over motor impulses, but according to Piotrowski, it reflects too the type of concession the individual is willing to make in order to stabilize his relationships with the world, as well as the individual's method of handling anxiety.

Thus it can be theorized from the Rorschach performance, that the overprotected patient, who has always had to make himself acceptable (i.e., meet the demands of the mother figure) in his attempts to maintain affection and protection, has probably always had to act in a more submissive manner, even if it involved yielding a part of his personality. Since he was not permitted to release his feelings or impulses, his main recourse was to withdraw and make himself as inconspicuous as possible until the danger was past. That is, his hostility and aggression were internalized, and this served only to enhance his feelings of anxiety and tension. This would be consistent with Tietze's (17) observation (after studying the personality characteristics of a group of mothers of schizophrenic patients) that it is the mother who dominates under the disguise of maternal love and sacrifice who is the most dangerous, because she deprives the child of any outlet for his aggressive impulses.

The general immaturity of the overprotected patients is reflected in their excessive preoccupation with themselves and their various conceptions of role in life. They are more interested in themselves and their ideas, but are much more confused in terms of their identification and sexual role. This is consistent with the belief expressed by Kasanin and his co-workers (7) that maternal overprotection plays a decided role in hindering the psychosexual development of these patients.

The weak drive and inability to deal with the world about them effectively or efficiently and lack of initiative are also reflected in the Rorschach performance of the overprotected patients. Since "things were always done for him", there was no need for the overprotected patient to make realistic plans for the future or organize his activities. Instead, he is inclined to take the line of least resistance. Whatever concerns he may have about the future seem to be met on a fantasy level. In fact, on the whole these patients are generally more autistic and fantasy ridden, finding it much easier to try to live out or achieve in fantasies not only the activities prohibited them in reality but their feelings and ideas about their relationships to others.

The rejected schizophrenic group

According to the statistical data, the rejected schizophrenic group gives significantly fewer responses, and its approach is essentially a W one (table 1). In comparing the W:M relationship, the balance is overweighted on the W side (1M to 3 or more W), and in this respect too,

the group differs significantly from the overprotected group (table 5).

While the rejected patients do not use a lesser percentage of M, they do use fewer M in terms of absolute number, and while there is no difference between the two groups in terms of the absolute number of C, the rejected patients do use a higher percentage of C responses (table 2). That is, they use a higher percentage of earthy and superficial color, as well as more CF responses (table 4).

M and C take on definite significance, however, when the M:C relationship is considered. That is, the rejected patients differ significantly from the overprotected patients in that the ratio is more weighted on the C than on the M side (table 5). Not only do the rejected patients use significantly less c than the overprotected patients (table 2), but when the C:c relationship is considered, the rejected group uses significantly less c than C which is the reverse of the ratio in the overprotected group (table 5).

While the rejected group does not produce significantly more or less FM responses (table 2), a greater percentage of the animal movement responses are classified as blocked animal percepts (table 3).

In terms of personality characteristics or behavior reactions the following interpretations are offered for the rejected patients:

1) The rejected group, while it limits its available energy in terms of actual productivity (fewer R), releases more of its activity in terms of the general approach to the environment. That is, the group is more unselective in its responsiveness to environmental stimulation (many W, fewer D and d). There is a lack of relationship, however, between the group's activity and ability to achieve or work toward specific goals (M too few in relation to W; quality of W). The quality of the W does not reflect a compulsive need to organize, or intellectual strivings, but reflects rather a tendency to deal with the environment in terms of vague generalities and poorly perceived superficialities as well as their inferior sense of reality (low F plus %; structural rather than combinatory W).

2) While the group does indulge in fantasy activity, its emotions are more unstable and labile (more CF) and it cannot control its impulses (few c). The group would thus not only appear to be more or less at the mercy of its emotions (more C than M), but the more restless would be the motility (more C than c), and the greater would be the influence of the immediate environment upon the patient's feelings and activities.

3) While the group's fantasies are less autistic (fewer M−, less M projected in d or in parts of human figures), and a greater percentage of its responses conform to the norm (higher P%), they are not willing or interested enough to make themselves acceptable to others (few c). While in early childhood it would appear that these patients could not decide whether to make their adjustments in an assertive or compliant manner (blocked FM), at present they are less tense and anxious (fewer m and c) and not too concerned with their conception of role in life.

While the literature reveals that much has been written on the reactions of the child to rejection, there would appear to be more divergence of opinion as to the specific nature of these reactions. Among the reactions mentioned by Symonds are attempts to win affection by affectionate advances, attention getting behavior through clinging or hyperactivity, psychopathic and unstable tendencies, counterhostility, fearfulness and retardation.

Wolberg (18) emphasized that the rejected child has difficulty in developing a repressive system capable of inhibiting immediate promptings, while Bender (2), on the other hand, found compulsive dependency and ingratiating behavior to be most outstanding in rejected children.

It is possible that the variability in personality characteristics reported by different investigators can be related, in part at least, to differences in the intensity of the emotional rejection suffered by the child and to the quality and/or quantity and nature of the neglect or deprivation. Less has been written on the relation between rejection and specific schizophrenic reactions than on overprotection and schizophrenic pathology. Frieda Fromm-Reichmann (4), however, does relate the schizophrenic's distrust and resentment of people to the rejection he encountered in infancy and early childhood by the mother.

The Rorschach reaction patterns of the rejected schizophrenic patients as reflected in the

present research would seem to fit in more with clinical observations and other investigations in which a relationship was postulated between rejection and acting-out behavior, rather than those which believed it led to compulsive dependency and ingratiating behavior. Most conspicuous in the rejected schizophrenics in this study is the low number of c or light shading responses. This would imply a lack of repressive or inhibitory mechanisms, less anxiety and tension, as well as a lack of interest or desire to make themselves acceptable to others.

While it would appear that they were very insecure in their convictions in early childhood, and could not decide whether to be aggressors or appeasors, as they grew older, they seemed to become less concerned about themselves and the effects of their behavior. It may be that they found that "appeasement" did not work (did not bring them the love or approval that they sought and needed), so to speak, and instead of blaming themselves they learned to project and blame the environment for their difficulties. One way to get back at the rejecting environment was through hostile and aggressive behavior.

They are as a group thus less inclined to introspection or obsessive ruminations about themselves, plans for the future and their relationships to others. While they function behaviorally on a more infantile level than the overprotected patients and are more inclined to get into difficulty with the environment since they do not inhibit, they seem to be much more at peace with themselves, as they have much less self-awareness.

One can speculate on a possible relationship between the acting-out behavior and the fact that the rejected group as a whole (mean C.A. 24.04) was four years younger than the overprotected group (mean C.A. 28.04) at the time of the first hospital admission. The rejected patient might require hospitalization sooner since behavioral disturbances would make them more conspicuous in the environment than would ideational disturbances.

Summary and Conclusions

This investigation was devoted to the purpose of studying the personality characteristics and reaction patterns, as expressed through their Rorschach performance, of a group of 25 maternally overprotected and a group of 25 maternally rejected patients.

In offering the following conclusions it should be kept in mind that it is realized that factors other than the maternal attitude play a role in moulding personality, that the results apply to group data, that the samples are small, and that individual differences do exist. The conclusions, too, must be delimited to male schizophrenics between the ages of 20 to 40, who are of average or better than average intelligence and who are first admissions to a mental hospital, without a history of a previous break or exposure to therapy.

1. While certain similarities are apparent between the two groups in that both groups of patients distort reality and reveal an ego that is not strong enough to handle life problems, each group attempts to handle its problems very differently. The overprotected patients are inclined to express their schizophrenic disturbances ideationally, while the rejected patients express their schizophrenic disturbances through the motor system.

2. The maternally rejected schizophrenics have much poorer control over their impulses and emotions and project their difficulties onto the environment. The overprotected patients are more frustrated and ambivalent in the outward expression of their feelings and impulses and tend to internalize or blame themselves for their difficulties.

3. The overprotected patients are more autistic, anxious and tense than the rejected patients. The findings suggest that this is related to their inability to release their hostile feelings and aggressive impulses because of their need and desire to make themselves acceptable.

4. The overprotected patients are more self-absorbed, more preoccupied with themselves and less secure in their identification, self-concept and sexual role than the rejected patients.

5. While the rejected patients on the whole function on a more infantile level, especially behaviorally, the overprotected patients are much more disturbed and show many more of the ideational reactions which are considered pathognomonic of schizophrenia.

6. In regard to indications for therapy, the findings suggest that with the overprotected

schizophrenic, treatment should be directed at decreasing anxiety through a weakening of inhibitory mechanisms and to helping the patient resolve some of his conflicting ideas about himself and his role in life. With the rejected patient, on the other hand, the findings suggest that the therapeutic goals should be directed at developing inhibitory mechanisms and a sublimation of destructive and hostile impulses into more constructive channels.

7. While the findings cannot be construed to suggest causal relationships, they do lend credence to the theory that the nature of the mother-son relationship has some bearing on schizophrenic reactions or symptomatology.

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SERPASIL AS AN ADJUNCT TO BRIEF INTENSIVE PSYCHOTHERAPY WITH TWO PSYCHOTIC PATIENTS

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Serpasil (Ciba) and other preparations from Rauwolfia have been extensively used in psychiatry even though they have only been available for a relatively short while. Reports (4, 5) have appeared stressing the tranquilizing effect of Rauwolfia and its power to alleviate anxiety. The use of psychotherapy in the treatment of schizophrenia has been reported by Schwing (6), Fromm-Reichmann (3), Eissler (2), Brody and Redlich (1), and others. The over-all impression from these various communications on psychotherapy is that each workers has a highly personalized technique, and that treatment is always a long term project.

The author was interested, therefore, in exploring the possibilities of intensive short term treatment of schizophrenia by psychotherapy, each treatment project to occupy not more than 60 therapy hours. The main barrier to this idea in the past has been the likelihood that such therapy would arouse intense anxiety in the patient during the remainder of the day when no support could be given; this anxiety might cause further regression and prevent any progress. The advent of Serpasil seemed to offer a hope of combating this anxiety.

The two cases described in this study were selected in the following manner: The writer, having been assigned to a group of wards, was making rounds with a nursing supervisor. In the course of the rounds she pointed out a young man sitting in a dejected fashion on the floor, saying that he appeared depressed and that he was not eating well, and that he should have a course of EST. This was the patient, Charles, later described. At about the time of the 20th hour in Charles' therapy, I was visited by the parents of another patient, George. Their son's previous ward physician had changed his assignment, and they wanted to make the acquaintance of his new physician. As I was not conversant with the details of their son's condition, I resolved to see him the next day, and he later became the second patient in the series. It can be seen, therefore, that the selection of patients was to some extent influenced by chance; also an attempt was made to control the conditions of the study by drawing as little attention as possible to the two subjects, thereby minimizing any change in the attitude of attendants. The therapeutic technique differed in each case, as will be apparent from the detailed description of the individual case histories. Charles presented a picture of slow personality disintegration; his delusional material was loosely structured and of an undifferentiated nature. His manner was apathetic, and he sat or walked by himself, rarely speaking unless addressed first. He is of dull normal intelligence (Wechsler I.Q. 87).

George, on the other hand, had marked hebephrenic features, with silly, inappropriate laughter, frequent impulsive outbursts, was a willing passive homosexual and of high intelligence, coming from a very cultured family background. Any interpretation presented to Charles had to be tailored to his intellectual level, he seemed primarily to require a sympathetic and friendly environment. George, on the other hand, required a burst of deep and direct interpretation before his psychotic defensive screen could be penetrated. Both cases were given similar doses of Serpasil, namely 5 mg. t.i.d. intramuscularly for the first two days and then 1 mg. q.i.d. orally.

Case 1: Charles is 26 years old, the fifth child in a sibling group of seven; four brothers and two sisters. His early development was uneventful until the age of 14 years; at this time he underwent a tonsillectomy and in the second post-operative day suffered a moderately severe hemorrhage from the tonsillar bed. He was unconscious for several hours but recovered after a blood transfusion and other supportive measures. Following his discharge from the hospital, he was noticed to be more clumsy than previously, and had a slight right-sided limp. This limp gradually diminished over the next three years and finally cleared up entirely. However, his general muscular coordination remained below average, and it suffered a marked deterioration whenever he was anxious. Charles completed the 8th

grade in school and then worked spasmodically on various farms and lumber sites until drafted in 1947. He saw two years of Army service. During his service, he was hospitalized on one occasion for observation. This occurred during his basic training; he could not march and drill to the satisfaction of his superiors, and so medical advice was sought. On discharge from the hospital, after a one-week stay, he was transferred to a tank unit, where he served satisfactorily for the remainder of his time. He seemed happy in the Army and felt accepted for the first time in his life. He was never in combat. On leaving the service he stayed home for a few months and, after several odd jobs, found steady employment as a factory guard at a chemical plant engaged in Government work. His chief duty was to check the identity of the workers entering and leaving the plant. He seemed to adjust to his job quite well for about 18 months. During this time, he was trying very hard to save enough money to buy a tractor so that he might work for himself as a timber hauler. The first hint of trouble showed itself as a bout of insomnia lasting some weeks. Charles took to drinking several stiff whiskies before going to bed, and for a time obtained relief this way. Then he began to feel uncertain of himself and to be confused as to the identity of the workers he was admitting to the plant. The faces on their identity picture buttons became strange, and he became fearful of spies and possible sabotage.

He left his job and returned home where his odd behavior and talk of destruction and death quickly caused his parents to seek his admission to a VA mental hospital in October, 1953. There he was diagnosed as schizophrenic reaction, chronic undifferentiated type, and given a course of EST. Following this, he improved somewhat and was discharged as improved, but with a guarded prognosis.

In December, 1953, he was admitted to the State Hospital in Butner, North Carolina, having become disturbed and hallucinated, and having attacked his mother and brothers with an axe. The clinical picture at that time was characterized by withdrawal, and blunting of affect; vague ideas of persecution and of reference, and by auditory hallucinations in which his name was called or some unpleasant things were said about him. He was again diagnosed as schizophrenic reaction and was given a course of 29 EST. Following this he made slow improvement and was sent home on a trial visit in October, 1954. While at home, he did no work and spent most of his time loafing or riding around in his car. In December, 1954, he became disturbed again and said that some neighbors were flashing car headlights at him, and that they wanted to send him back to the hospital. Later, he attempted to attack a neighbor, with whom he was annoyed, and also his mother. Therefore he was returned to the hospital on December 15. He was given a short course of some 6 EST and assigned to a chronic ward. I first saw him in January, 1955, under circumstances previously described.

Therapy was started on January 4, 1955. The first five sessions were occupied with Charles' verbalizing his deep sense of inferiority and his feeling of rejection, occasioned when he returned home from the hospital following his tonsillectomy. He felt that his mother and father no longer loved him to the same extent as before, and that they preferred his siblings. Since he was teased badly at school over his clumsiness, he gave up playing ball. Many ambivalent feelings towards the father were revealed. Charles alternated between hostility at his father's alleged preference for the oldest brother and concern and worry over the hard struggle his father has had to make a living in his barber shop. Much hostility was directed against the hospital and staff where the tonsillectomy was performed; on a deep level the hemorrhage was interpretated by Charles as a castrative punishment.

In the 7th hour, overt hostility towards his oldest brother was expressed. This brother is quite successful as a business man and owns a cannery in which some of the family are employed. By the 11th hour, the nursing staff reported that Charles had become markedly hostile to the other patients, and had been acting out. He then entered into a phase of extreme hostility towards myself, telling me, "I don't appreciate this damn treatment, if you want to know." He further questioned my ability as a physician and refused all offers of cigarettes or sweets. Following interpretations of his feelings, he became more friendly and began to cast me in "the good father role," becoming dependent in manner, eager for any small gifts I might bestow upon him. Gradually with support and encouragement, he began to take more interest in things around him and to want to attend recreational activities.

In the 18th hour I guided Charles to the subject of his feelings for his mother. Immediately strong resistance was aroused with much blocking of thought and motor agitation. He was unable to sit still, and indignantly refuted my suggestions that he felt hostile towards her, even threatening to strike me if I continued to press him. Following this session, his Serpasil dosage was supplemented by intramuscular injections of 5 mg. t.i.d. for three days. In the next sessions his feelings for his mother were worked through with the aid of strong interpretation. As his hostility subsided, Charles seemed to take a big step forward. He requested a ground privilege card and asked for a transfer to a better ward. He began to shave and bathe regularly and to wear his own clothes. He now freely discussed his feelings of unreality and of reference, and spoke of his need to count the chairs and windows in the ward several times a day in order to reasure himself of his surroundings.

At the time of the 40th hour of therapy, this writer's wife gave birth to a son. Charles reacted to the situation with temper tantrums and negativism. This was countered with deep interpretations. These together with sympathetic attitude of the attendants on his ward helped to tide him over. The incident seemed to act as a powerful stimulus to him; he seemed to realize that those around him would not necessarily punish him for hostile feelings, and that I (in the paternal role he had cast me) would not reject him because I had a new son.

The remainder of his hostility towards his elder brother was now worked through, and by the 50th hour, I had begun to taper the therapy off with a view to a home visit. An interview with the family proved them to be very cooperative and eager to help in any way possible. The elder brother had a second-hand tractor

which Charles could use to haul timber to the local sawmill. Thus the problem of employment for Charles in a non-competitive environment was solved. Accordingly, he was then furloughed to his family, to live at the home of one of his married brothers. Continuation of the oral Serpasil was advised. At the time of the 48th therapeutic hour, psychological testing was repeated with the following result: Rorschach testing. "Sexual identification has improved from a confused and possibly homosexual one to a clear cut masculine attitude. Reality testing is better, and Charles is more able to cope with environmental stress, as is seen in the use of color. He is still threatened by the sex card."

I feel that the clinical improvement in Charles is reflected to some extent in the Rorschach picture. His subsequent progress has been very encouraging. The last follow-up letter from his mother in October, 1955, reported that he is now successfully running a chicken farm, has made a very good adjustment in his small rural community, and seems very happy.

Case 2: George is 23 years old and is the middle child in a sibling group of three brothers. His early development was, as far as can be ascertained, reasonably normal, and he had shown promise quite early in life of possessing above average ability. He had been educated in a private preparatory school and, at the onset of his illness in March, 1950, was preparing to enter college. For some time his manner had caused his parents some anxiety, and certain ideas contained in his essay themes had led his teacher to consult his parents. The home background was an extremely cultured one, and there was considerable pressure on George to succeed. One evening in March, 1950, George became extremely disturbed while playing bridge with his parents, talking of destruction of the world by atom bombs. The backfire of a passing car was interpretated by him as "there goes Chicago; New York is next."

He was taken to the psychiatric clinic of a nearby teaching hospital, where acute schizophrenic episode of unclassified subtype was diagnosed. A full course of deep coma insulin was administered, and following this, he was discharged to his home as "improved, but not recovered" in August, 1950. He relapsed in December and received a further course of insulin, this time on the subshock level. He ran away from the hospital in March, 1951, and when found, was committed to the State Hospital. He was again diagnosed as schizophrenic psychosis and received a course of EST and Pitressin (Parke Davis) injections. From March until September of 1952, George received a further course of deep insulin with little effect. In December, 1953, a home visit was allowed, but he returned to the hospital in a few days, having tried to attack his parents. His conduct now became so aggressive that his parents requested an attendant to be present at their visits with their son. From then until October, 1954, he received a large number of EST's for management purposes, and gradually passed into a state of mute negativism.

On January 29, therapy was commenced under the circumstances previously described, Serpasil having been started some three days earlier. The initial interview showed George willing to talk, but suffering great difficulty in expressing himself due to excessive blocking and frequent neologisms. The next 11 sessions were conducted with George remaining entirely mute. These hours were spent with the therapist keeping up a constant barrage of analytical interpretations, based upon incidents in George's history, knowledge of and from his parents, and material from Rorschach testing. During the 13th hour, he consented to speak. He stated his problems thus: "I'm a lost person, I have no place or position, I have thrown away my liberty by my own view of the social relationship." Therapy now continued with the therapist taking a very active role. By the 20th hour, George was beginning to verbalize quite well; he felt chronically fatigued most of the day and spent most of it lying on his bed with his head covered up.

Indecision still plagued him, and he found it almost impossible to express hostility in a direct way. Week-end visits were encouraged, and it was interesting to observe how he behaved on them. He tried to remold his relationship with his mother and spent a great portion of his visit helping her in the kitchen and about the house. In the sessions following the week-end, he would work through his feelings of hostility and the defenses he had employed against them. He was able to verbalize the tremendously strong sexual impulses he had for his mother and the almost uncontrollable rage that their non-satisfaction roused in him. By the 44th hour, he reported that his parents no longer felt afraid of him, and they no longer had anyone stay with them the week-ends he was home. The fact that he was able to control the hostility he still felt, and that he had been able to communicate this to them by his attitude and behavior was a source of great satisfaction to him.

George still felt tremendously threatened by his environment and would seldom venture outside. He verbalized fantasies of being molested by assassins who "might attack me and fracture my liver," or "bricks may fall from the wall and crush my skull." By the 55th hour, it was felt that the limited social facilities of the hospital were impeding his progress, and arrangements were completed for him to live at home and receive weekly therapy at a nearby psychiatric clinic. Before leaving the hospital, further psychological testing was completed. The Rorschach report reads as follows: "A feminine sexual identification is present with a suggestion that the patient is struggling to establish more masculine features. However, he realizes that masculine sexuality entails certain problems of initiative and responsibility which he has passively avoided and which he is anxious about considering. His previously noted orally dependent attitude is apparently at or near the conscious level, and he is seeking to reject it. Some hostility is evident in the patient, and it is interesting to see how he deals with it. Projection is the primary defense at present although the aforementioned compulsivity is still evident. However, a counter phobic reaction is suspected in which the patient is beginning to accept some hostility in himself as a reaction against that previously as emanating from the environment. He also tends to rationalize. A comparison between the Rorschach administered in 1951 and the present record reveals that the patient is now working out of his shell while utilizing his fantasy as a means of

dealing with his problems. While no insight in the usual sense is suggested, he apparently is approaching some understanding, particularly on the dynamic level."

A letter from George's father in October, 1955, reveals that initial gains have been consolidated and that he is slowly moving towards a stable adjustment. He has not been able to return to studying and has not been gainfully employed, but gives indications that a non-stressful occupation may not be beyond him in the foreseeable future.

Discussion

Two cases of moderately chronic schizophrenic illness have been presented. In each case a good degree of social recovery has occurred. Projective testing has confirmed this improvement. To what can this change be attributed? To the writer's way of thinking, no single factor is responsible. In the case of Charles, I am inclined to place most weight on the factor of attention and kindly care; here is a lowly endowed person who had retreated from a threatening world. Somebody to whom he could relate took an interest in him, and under the cover of the identification, Charles was able to reestablish himself. I place a minimal significance on the technical aspects of therapy in this case. Serpasil was undoubtedly useful in controlling anxiety, particularly between the 18th and 25th hours of therapy.

In the case of George, I am inclined to place more weight on the technical aspects of the psychotherapy, particularly in the sphere of role playing; the core of George's problem seemed to be that his feelings for his mother were completely unacceptable to him. The demonstration by means of example and interpretation that such thoughts were possessed by other people also, and his emotional acknowledgment of it seemed to be a turning point for him. I feel that, subsequently, he progressed more by a natural process of maturation than anything else. Again Serpasil appeared to enable progress to be made in verbalizing unpleasant material without the production of crippling anxiety.

Finally, it must be remembered that remission is to be expected in schizophrenia, and the particular factor(s) responsible in individual cases remains unknown.

Summary

1) Two cases of schizophrenia have been presented.

2) Treatment by brief intensive psychotherapy with adjunctive use of Serpasil has been described.

3) The result in each case is favorable.

4) Possible factors influencing the remissions have been discussed.

The work herein described was carried out at the State Hospital at Butner, North Carolina. Permission for publication has been given by the General Superintendent, North Carolina Mental Hospitals. The opinions expressed are those of the author alone and do not necessarily reflect those of the North Carolina Board of Controls. Thanks are due to Mr. G. Wenzel, M.A., and Miss N. Hanel, B.A., of the psychological department for the Rorschach reports.

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THE USE OF METRAZOL AS A MOOD CONDITIONING DRUG: A DISCUSSION AS TO ITS MODE OF ACTION

A Preliminary Report

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INTRODUCTION

Recently mood conditioning drugs have attained a widespread usage in man's cold war against his cultural environment. Although this tendency toward "psychotherapy in the pill form" has been opposed by certain segments of the medical profession, the trend appears to be continuing practically unabated. The lack of properly trained personnel, the vastness of the problem, as well as the fact that present analytic techniques have but a limited application and/or appeal have stimulated thoughtful research, not only as to the etiology of mental illness but as to its cure as well.

The history of psychiatric interest in such hallucinogenic drugs (known also as phantastica, psychotica, or hallucinogens) has been reviewed by Mayer-Gross (27). Lysergic acid diethylamide known as LSD-25 was first prepared around 1937 and has currently been receiving considerable attention as an hallucinogen (30, 33). Rinkel, Hude and Solomon (32), integrating a diverse group of arguments, feel that lysergic acid interferes with adrenalin synthesis. They cite the work of Witt (44) who observed that lysergic acid-treated spiders spin finer strands into more regular webs. Since the spider's web is composed largely of adrenalin, the finer strands indicate a block in adrenalin synthesis. Fischer (8) has observed certain chemical similarities, although remote, between the hallucinogens and the sympathetic amines; and it is apparent that lysergic acid, as do most other hallucinogens, exerts an effect on autonomic activity.

Concomitant with the above studies, important strides have been made in the chemotherapy of anxiety and psychotic states. Tranquilizing agents have appeared which, unlike the barbiturates and other soporific drugs, are not depressant to the cortical centers but apparently act on the lower centers in the region of the hypothalamus. Two of the most widely used are Rauwolfia serpentina and chlorpromazine. The former drug was first described by Bhatai in 1942 (3). The earliest publications on chlorpromazine, in the American literature, are those of Lehmann (22) and Winkelman (42). The reports of these authors generally suggested a usefulness of the drug in states of motor excitement, and it appeared to have qualified usage in neurotic and psychotic illnesses. Other studies to find a useful drug have centered around Miltown, a propanediol derivative developed by Berger (2) and clinically studied by Selling (37).

Aside from tranquilizing agents *per se*, mood changes have been observed following analeptic therapy. Laufer and Denhoff (20) felt that amphetamine had a beneficial effect on the behavior of children affected by the hyperkinetic syndrome: a syndrome related to a diencephalic dysfunction in which the individual becomes unusually sensitive to stimuli flooding in from both peripheral receptors and viscera. Marazzi (26) feels that this improvement can be attributed to the neurophysiologic evidence which suggests that sympathetic and sympathomimetic amines inhibit synaptic transmission. Similarly pentylenetetrazol (Metrazol), a synthetic analeptic, as described by Andosca (1), Lieberman (25), Chesrow *et al.* (5), Fong (10), Smigel and his associates (38), and Seidel, Silver and Nagel (36), has been found to achieve beneficial behavior changes in patients having a chronic brain syndrome. Little is known whether or not pentylenetetrazol causes a reduction of perceptual cues or a modification of the emotional or painful implication at a cortical integrative level. The purpose of this paper is to determine objectively what psychosocial changes follow the adequate use of Metrazol. It is hoped that this information will be helpful in future patient selection as well as aid in defining the mode of the compound's action.

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Procedure and Results

I. Clinical

In 1949 Hirschmann (14) gave subconvulsive doses of Metrazol particularly in endogenous depressions, using intravenous dosages of 1.50 to 4.00 cc. He was impressed by the results achieved with this technique, particularly in elderly persons just beginning to manifest signs of mental deterioration. In our study one cc. of Metrazol solution (gr. 1½) was given intravenously, with the patient lying quietly in bed. During the initial phase, until the subconvulsive dose was established, the injections were given daily. The second dose was increased to 1.50 cc., and if no reaction occurred, it was increased 0.2 cc. each time until the given dose produced a definite but recognizable reaction. This reaction consisted of a slight tremor of the body, twitching about the mouth, marked facial flushing or a definite blacking out by the patient for a period of five to ten seconds. The maintenance dose was 0.2 cc. less than the subconvulsive dose, and the patients received 16 such injections given at intervals of two to three days. The average maintenance dose was 2.0 cc. varying between 1.4 and 2.8 cc. Clinical improvement was generally noted about 10 to 14 days after the onset of maintenance therapy. The placebo injection was given intravenously, as directed above, and contained 2 cc. of normal saline.

No psychotic patients were used in this study. Prior to the investigation, a complete history was taken and a physical examination carried out. This included the following laboratory studies: complete blood count, non-protein nitrogen, blood sugar, total protein and A/G ratio, electroencephalogram, electrocardiograph, skull films, x-rays of the entire spine, eye ground evaluation by the opthalmologist and, if possible, a lumbar puncture. The diagnosis of chronic brain syndrome was established following a careful psychiatric interview. The average age of the patients was 66, and the ages varied between 55 and 81. Although almost all of the electrocardiographs showed changes consistent with arteriosclerotic heart disease, this did not prove to be a contraindication to therapy. All of the patients had been in this hospital for a period of at least two months, and it was felt that any improvement shown could not be attributed to "hospital influence". Electroencephalograms were taken serially on all patients during the study; these were interpreted by the neurology department without any information as to which patients were receiving Metrazol or placebos. Likewise, independent observations on the part of the ward nurses and the clinical psychologist (E. C. B.) were made under the same controlled conditions as outlined above. It is interesting to note that one patient showed, while receiving placebos, a remarkable improvement in his electroencephalograms.

The study was divided into two phases. During the first phase, the following patients were given intravenous injections of Metrazol: (1) R. L., (2) W. H., (3) W. A., and (4) J. M. The patients receiving placebos were (5) J. W., (6) R. G., and (7) H. M. During the second phase, unknown to all except one of us (I. K.), the individuals who previously received the placebos were given the Metrazol injections. The converse was not done because those who had been treated with Metrazol during the initial phase achieved such a degree of clinical improvement that it was felt unfair to prolong their hospitalization. Of the group studied, all except (5) J. W. have left the hospital; (7) H. M. died about six months after discharge.

Our clinical evaluation of the subjects' response was divided into three categories: good to excellent, moderate and equivocal, or no response. Patients (1) R. L., (3) W. A., and (6) R. G. were placed in the first category; cases (2) W. H. and (4) J. M. into the second. The improvement observed in (5) J. W. and (7) H. M. was equivocal. Thus, satisfactory changes were noted in approximately 70 per cent of the patients.

The following case reports are representative of the clinical improvement shown in each of the above-mentioned categories.

Case 3: W. A. This 62-year-old, white male, World War I veteran was hospitalized because he made an unsatisfactory adjustment in the domiciliary section of this facility. He had numerous vaguely described symptoms. Preliminary laboratory studies were within normal limits. The ophthalmologist felt that the eye ground changes fell into the Keith-Wagner grade II classification. His subconvulsive dose of Metrazol was found to be 2.0 cc., and he was given 16 intravenous injections of the medication. No change in blood pressure was recorded. It was felt that the patient showed a good to excellent clinical response. At the time of admission he was so forgetful that he could not remember the loca-

tion of his bed. After therapy his memory improved, and he showed an awakened interest in his surroundings. Following discharge he wrote a cordial note thanking us for our assistance. He was maintained on oral Metrazol, grains 1½, four times daily.

Case 4: J. M. was a patient who showed a moderate clinical improvement. This 70-year-old, incontinent, white World War I veteran was admitted to the hospital because he had become too disturbed to remain in the domiciliary section. In addition to the chronic brain syndrome he was found to have Paget's disease. The ophthalmologist recorded grade II eye ground changes. The electrocardiograph showed auricular fibrillation, left heart enlargement and an old anterior wall myocardial infarction. The electroencephalogram, although initially negative, showed some changes following therapy. It was interpreted as being moderately abnormal with scattered paroxysmal and slow dysrhythmias. The serum calcium was 4.9 mEq/L; phosphorus, 4.1 mg. per cent; alkaline phosphatase, 16.3 Bodansky units. Roentgenograms of the pelvis and spine showed changes consistent with Paget's disease.

Prior to therapy the patient became so boisterous and hyperactive that it was felt that he should be transferred to the psychiatric ward. His subconvulsive dose was found to be 2.8 cc. of Metrazol; he was given 15 injections. Although he remained somewhat confused, he was no longer incontinent and became most amenable to the ward routine. He was satisfactorily discharged to the domiciliary division on a maintenance dose of 3 grains of Metrazol, four times a day.

Case 7: H. M. is an example of an equivocal result. This 68-year-old, semiretired college professor, a veteran of World War I, was admitted to the hospital because he had become too difficult to manage at home. He had been on Serpasil for five months prior to admission. At the time of admission he was depressed, mildly disoriented and somewhat incoherent. When placed on the ward he adjusted poorly and resented the fact that some of the aides were Negroes. The Serpasil was discontinued, and no mood conditioning drugs were used. He gradually improved, and it was felt that his progress justified the use of a comprehensive rehabilitation program. About six weeks after admission the patient was placed on a month's course of intravenous Metrazol therapy. The comparative psychometric studies showed a measurable improvement. However, clinically he appeared to be more agitated; he was less amenable to the ward routine and requested that he be discharged. He died at home about six months later. This paradox between the improved psychometric studies and a deteriorating clinical status was indeed perplexing, and more will be said about it in the discussion.

II. Psychometric studies

An effort was made to see if the clinical changes effected by Metrazol could be measured by repeated administrations of psychometric tests. At no time did the clinical psychologist (E. C. B.) have any knowledge as to the patient's clinical history, nor did he know which ones were receiving Metrazol as opposed to placebos. The following battery of psychologic tests were used: the Comprehension, Similarities and Picture Arrangement subtests of the Wechsler-Bellevue Intelligence Scale; the entire Wechsler Memory Scale; Year X through Adult I of the Porteus Mazes; Cards II, IV and VII of the Rorschach Psychodiagnostic Test; and Examiner's Rating based upon behavioral observations during the testing session. In all, data were obtained from 22 variables. After the scoring, which is to be described in the following paragraphs, a prediction was made as to which patients received the Metrazol therapy. The percentage of accuracy for the testing technique was then determined.

Each of the 22 variables was scored. This was done quantitatively for the Wechsler-Bellevue, for the Wechsler Memory Scale and the Porteus Mazes. Scores were arrived at qualitatively, through the use of clinical judgment, for the Rorschach and Examiner's Rating. Each performance was then compared with an earlier one, and the numerical difference recorded. The

TABLE 1.—RANK ORDER*

Part A

Subjects	Tests			
	Wechsler prorated Full Scale IQ.	Wechsler Memory Quotient	Porteus Year X	Rorschach Card II
1. R. L.	4	2	3	1
2. J. M.	7	6	5	6
3. J. W.	3	7	7	7
4. W. H.	1	4	1	3
5. W. A.	2	3	6	4
6. R. G.	5	5	2	2
7. H. M.	6	1	4	5

* Selected variables.

Part B

Subjects	Sum of Rankings	Final Rank
1. R. L.	66.0	1
2. J. M.	113.5	6
3. J. W.	123.0	7
4. W. H.	86.0	5
5. W. A.	71.5	2
6. R. G.	83.0	4
7. H. M.	73.0	3

subjects were then ranked in the order of their adequacy of performance. Thus, a patient showing the greatest increase in terms of I.Q. points, for example, was assigned a rank of one. The subject showing the least increase or the greatest loss, as the case may be, was assigned a rank of seven, and so forth for all the intermediary ranks. In Part A, table 1, one sees a partial listing of the comparative data derived from the various tests. In Part B, these ranks, as well as those from the remaining 22 variables, were summed and averaged, and a final ranking was determined.

It was predicted that those patients with the highest rankings, four in number, should have been the ones who received the Metrazol therapy. The psychometric predictions were then compared with the clinical data. The degree of correlation between the psychologic rankings and the medical data was computed using a new rank correlation method (tau beta) devised by Kendall (18). This yielded a Critical Ratio of .707, indicating that these predictions exceeded chance and could be accurate about 67 per cent of the time. The same analysis was then extended, and the rank of the patient on each of the variables was compared with the known clinical data by the above-described method. These comparisons yielded Critical Ratios varying from +2.000 to −1.426. Although this reflects a broad range of predictive value, using a cutting point of ±1 sigma or approximately the .20 level of confidence, the following emerged as significant: the Picture Arrangement subtest of the Wechsler-Bellevue and the Orientation, Visual Reproduction, Digits Forward, and Associate Learning subtests of the Wechsler Memory Scale.

Since the level of confidence is not so high as desired, one cannot at this time conclude that Metrazol causes dramatic psychological changes. However, with a broader spectrum of tests designed to evaluate behavioral and social changes or with a greater number of subjects the desired statistical levels of confidence might be achieved.

Our test battery was then evaluated by Kendall's coefficient of concordance (18). This was found to be .229. The significance of this coefficient (X^2_r) was tested and found to be 30.27. This is a figure which falls much beyond the .01 level of confidence, indicating a hemogeneity of the test battery in terms of intellectual powers.

Since all aspects of personality are interrelated, it can be inferred that some of these intellectual traits do modify social behavior. Thus it appears that Metrazol does provide certain kinds of psychologic help; namely, in orientation, in ability to size up and comprehend a practical, social situation, and in associate learning of new and unfamiliar material. It seems to have a detrimental effect on visuomotor functioning and also on the mental control needed for prolonged attention and concentration.

Discussion

The role of Metrazol as a mood conditioning drug has been studied by many observers, Chesrow (5), Seidel (36), Smigel (38), Fong (10), Lieberman (25) and Andosca (1). The above, in varying percentages, noted an improvement in impaired behaviorism. Although unable to notice any significant difference between the experimental and the control groups while using the Elgin State Hospital Behavior Rating Scale, Swenson and Grimes (39) felt that the therapy patients were more cooperative and less antisocial in their behavior. Levy (24), utilizing the verbal scale of Wechsler-Bellevue and clinical observations as defined on the Revised Malamud Sands Worchester Rating Scale, felt that positive results were manifested on all of the evaluation instruments. It was Levy's impression that intellect and memory changes are usually the first aspects to suffer, and losses in these areas are often found to be irreversible. The personality and behaviorial changes which occur later in the progress of the disease tend to be subject to arrest or reversal. Finally Mead *et al.* (29), in a comprehensive placebo controlled study on 24 unselected old persons, found in a statistical summarization of their data that all the chi squares (X^2) were non-significant. They concluded that there was no significant improvement of the drug group for any of the measures tested. Although our results, as already presented, will require further confirmation, the use of substimulating doses of intravenous Metrazol appeared to effect a clinical improvement in 70 per cent of the cases, and a measurable psychometric improvement was observed in orientation, in ability to size up and comprehend a practical, social situation and in associate learn-

ing of new and unfamiliar material. It was to be noted that all of these contributed to what is known as social intelligence or adaptability. The therapy also seemed to have a detrimental effect on visual reproduction, which requires a high level of organization and coordination of the visuomotor apparatus, and similarly on attention and the mental control needed for concentration.

In these studies intravenous Metrazol was used instead of the oral preparation. Andosca's (1) report indicated that the group receiving the larger dose of Metrazol (3 grains, four times daily) showed the greater percentage of improvement. It was thus felt that the intravenous approach would be more accurate because one would be giving the drug until a clinical reaction was achieved. On a chronic basis, however, the maximum benefit from Metrazol probably favors the oral preparation. The effect via this route is more sustained and usually lasts for a period of six to eight hours. Esplin (7) found that Metrazol is very evenly distributed through the tissue except for a transient increased concentration in the liver. Although the drug is excreted rather rapidly by the kidneys, generally the excretion is not complete until 48 hours.

The medication sometimes exerts a noticeable clinical change in as short a time as five to seven days. Usually, however, significant changes are not noticed until 30 to 60 days. If the oral medication is stopped after maximum benefits have developed, regression will take place in about four weeks. This apparently can be indefinitely prevented by giving a maintenance dose equal to about one-half the therapeutic dose.

Although Metrazol has been used as a general analeptic for years, the site and mode for its effect on mental function have, as yet, been unexplained. Its actions are highly complex and apparently occur at all levels of the cerebrospinal axis. Despite its primary action on the respiratory, vasomotor and vagal centers of the medulla, it is evident from its ability to counteract the depression produced by hypnotic drugs that Metrazol acts on the higher centers of the central nervous system as well. Forbes and Nason (11) felt that it dilated cerebral vessels and that its peripheral action on the heart and blood vessels was negligible. Its use in epileptics where the epileptogenic focus can be made to discharge under the influence of the drug suggests an altered synaptic transmission (6). If one applies acetylcholine to an epileptogenic focus, the topical application of Metrazol causes the sensitized area to discharge before the other areas of the brain are affected (13). Torda (40) postulated that Metrazol exerted its analeptic effect both by an increase of the acetylcholine content of the brain and some still unidentified process. Umrath (41) felt that cholinesterase inhibition rather than increased acetylcholine production was the important factor.

Although the inhibitory action was of brief duration, histamine exerted an anticonvulsive effect when used before Metrazol therapy. It, however, had no effect on electrically-induced seizures. From this, one might conclude that Metrazol differs from electroshock in that its effects can be related to an alteration in membrane permeability or a change in cellular metabolism (16). Fischer (9) corroborated this possibility when he infused the medulla and cerebellum with a Tyrode's solution containing fluorescein. The concentration of the dye in the outflow depended upon the vessel permeability. Following the administration of Metrazol there was a definite increase of the dye in the outflow.

The precise measure of cerebral circulation and metabolism, as made possible by the development of the nitrous oxide technique, has afforded us with a method of evaluating the action of Metrazol and other drugs on the brain (12, 19, 35). Scheinberg (34), in his studies of nicotinic acid, was not convinced that there was an increased flow of arterial blood in the brain tissue. He asserted that the flushing of the face and neck was no evidence that a similar flushing took place internally. Kety and Schmidt (19) felt that the mental disturbances in the senile could be related to something more than a reduction in cerebral oxygen utilization on the basis of a decreased cerebral blood flow. He postulated the possibility of complex yet subtle biochemical changes being responsible for the aberrations in the higher psychic functions.

When Hoffer *et al.* (15) reported on their studies with an hallucinogen called adrenochrome, a compound related to both mescaline and adrenalin, they cited some studies which suggested that the biochemical changes secondary to the use of Metrazol may result in an increased adrenochrome or adrenoxane produc-

tion. Chance (4), in his studies in brain metabolite concentration, noted that Metrazol produced a marked glycogen increase in the cortex, a somewhat lesser increase in the medulla, and almost as marked in increase in the midbrain. Woodford (15) noted that when adrenochrome entered the cerebral cells, it also markedly inhibited the intermediary metabolism of the carbohydrates. The epileptogenic activity of Metrazol has already been discussed (6). Adrenochrome, in the opinion of Hoffer (15), has displayed a similar and probably more effective epileptogenic activity than Metrazol in patients with a normal electroencephalogram and a clinical history of epilepsy. More work will have to be done before the significance of the degradation products of epinephrin, as well as their relationship—if any—to Metrazol, will be completely understood.

It has become increasingly apparent that, as the usage of mood conditioning drugs becomes more widespread, there appears to be a definite limitation to their psychotherapeutic potentialities. Before initiating mood conditioning therapy, the clinician may be confronted with this dilemma: Does the individual need to be made more—or should he be made less—aware of his environment? One must postulate that certain individuals, particularly those who operate with only a modicum of personality control, need a full and accurate account of the events which blend them with their environment. There are, however, those patients in whom the perceptual cues should be blunted, and one should strive to maintain or increase the detachment between them and their environment. Failure to recognize this may sometimes cause the patient serious harm. We (17) recently described a patient suffering from cerebral arteriosclerosis in whom the perceptual distortions attendant to the use of Serpasil were such that he became psychotic. Withdrawal of the medication resulted in a marked improvement in his mental efficiency. It is possible that, in this study, patient (7) H. M. was harmed by the use of analeptic therapy. The heightening or sharpening of alertness, the greater and quicker responsiveness as well as a general increase in the activity level following the use of Metrazol may have made this individual more aware of his altered physical, psychologic and social status. Since he was a college professor and a man of great attainment, he may have preferred the protectiveness of lethargy as opposed to the agony secondary to a clearer comparison of current with past capabilities. In retrospect, our program of rehabilitation for this patient probably should have stressed adaptability to a custodial existence, and little if any attempt should have been made in the direction of intellectual improvement. Nevertheless, as a therapeutic "weapon" in the "war" against decline and unnecessary institutionalization, our studies as well as those of others indicate that Metrazol may have an activating effect particularly in those cases where the brain damage is not marked. Through a heightening of sensory awareness, it may be possible to increase the individual's ability to differentiate between self and surround. With a better defined self-concept, the patient could achieve some independence from his perceptual field, engage in some analytic thought, thus establishing within himself a basis for renewed coping with reality.

At the present our studies, as well as others including Levine (23), Postman (31), McGinnies (28), Lazarus (21) and Witkin (43), have indicated that the individual's adjustment is governed not only by his capacity for perception but by his established coping techniques. The mood conditioning drugs clearly indicate that both can be altered. Still to be answered is the basic question, How?

Summary

The role of Metrazol as a mood conditioning drug has been carefully evaluated. It is our clinical impression that in arteriosclerotic patients Metrazol does tend to modify social behavior. Psychometrically, measurable improvement is noted in orientation, in ability to size and comprehend a practical social situation and in associate learning of new and unfamiliar material. However, the same testing shows Metrazol to have a detrimental effect on visual reproduction requiring a high level of integration of visuomotor functioning, and also on the mental control needed for prolonged attention and concentration.

Although the clinical impression of improvement was not as clearly borne out by the psychometric studies, it was felt that a broader spectrum of tests and/or a greater number of subjects might resolve this ambiguity.

The site and mode of Metrazol's action are discussed. This included a reference to the possible relationship between it and the degradation products of epinephrin.

The psychosocial changes which follow the use of mood conditioning drugs indicate that care should be exercised in their selection. Some of the factors, which may govern the use of tranquilizing as opposed to analeptic therapy, have been presented.

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AN ATTEMPT TO DEMONSTRATE A CATATONIGENIC AGENT IN CEREBROSPINAL FLUID OF CATATONIC SCHIZOPHRENIC PATIENTS

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Previous investigators have sought to isolate a biological and biochemical agent in psychotic patients by subjecting plants, fungi and small mammals to various procedures involving urine, blood and cerebrospinal fluid of schizophrenic patients. The most interesting findings were obtained with cerebrospinal fluid.

In 1932 Gamper, Kral and Stein (8) reported that the injection of cerebrospinal fluid from schizophrenic patients into the anterior chamber of the rabbit's eye caused marked inflammatory changes and that this did not occur with cerebrospinal fluid of normal persons. In 1933 Gamper and Kral reported an increased morbidity and mortality in white mice after injecting cerebrospinal fluid of schizophrenics into the subarachnoid space. Severe degenerative changes were observed in the brain and liver at autopsy (9). In 1937 they subcutaneously injected cerebrospinal fluid into a large number of young mice. The greatest mortality occurred with the animals injected with cerebrospinal fluid of schizophrenic patients although the fluid from organically injured and non-schizophrenic psychotic patients also caused some fatalities (10). It was found that cerebrospinal fluid from the catatonic group of schizophrenic patients resulted in a higher mortality than that produced by fluid of hebephrenics, and that the injection of fluid from hebephrenics resulted in a greater mortality than that of the paranoid patients. The fluid from persons with acute derangements was more toxic than that from chronic cases, and concentration of the cerebrospinal fluid increased the toxicity. Dialysis and ether extraction experiments were negative. Wahlstrom (19) reported somewhat similar results with serum. Reiter (15) could not duplicate the findings of Gamper and Kral. In 1938 Sogliani (18) tested the effects of cerebrospinal fluid from acute and chronic schizophrenic patients on rabbits and mice and could not find any differences between these states although catatonic symptoms were produced in the mice. However, Sogliani used a different dosage and the intraperitoneal site of injection. In 1939 Claude and associates (4) reported an inhibiting action of cerebrospinal fluid from schizophrenic patients on the genital tract of the frog and on the action of chorionic gonadotrophic hormone. Since there was no control group, it is difficult to evaluate this finding.

LeGrande and Année published a preliminary report on their work in 1938 (12), and a more complete report in 1939 (13). These authors experimented with different dosages of cerebrospinal fluid, injection sites and methods. They found that 30 ml. of cerebrospinal fluid evaporated in a current of dry air at a temperature not exceeding 37°C. and when injected subcutaneously into rats weighing 100 gm. produced catatonic symptoms. In about one-half hour after the injection the rats become apathetic, listless, lost their spontaneous activity and at times assumed catatonic postures. These effects lasted from several hours to more than 48 hours. Some of the animals died. Of 13 test fluids from patients who were "schizophrenics of the hebephrenic-catatonic type, inert and indifferent", 10 yielded positive results and three negative results, and of the six control fluids from patients who had "great physiological defects and who were partly epileptics", all gave negative results. They also reported that the catatonigenic substance is inactivated when exposed to a temperature of 45° C. for one-half hour but not at 40° C., that it is destroyed by cold, that the activity slowly disappears at room temperature and is greatly attenuated after 24 hours, that the property can be evaporated to dryness and redissolved in distilled water and that filtration, centrifugation and dialysis have no effect on the activity. Since 1939 no report of similar work has appeared. Sediani and Moretti in 1952 (16), however, reported on the effect of cerebrospinal fluid on the neuromuscular preparation of the

frog and observed that cerebrospinal fluid from catatonic patients decreased the excitability of the muscle. No statistical data were presented, however, and no normal fluid was tested.

Based primarily on the work of LeGrande and Année it was felt justifiable to continue experimentation in this field, and an experiment was therefore designed to test for the presence of a catatonigenic agent in the cerebrospinal fluid of catatonic patients.

Method

Forty-five milliliters of cerebrospinal fluid were drawn by lumbar puncture. Analysis of the fluid included: cell count, glucose and protein determinations, and colloidal gold and Kahn tests. Thirty-five milliliters of the cerebrospinal fluid were lyophilized immediately, and the dry substance was stored in a refrigerated vacuum desiccator. The dry substance was then redissolved in 3.5 ml. of distilled water and injected subcutaneously into young rats (3 ml. per 100 gm.). Sterile technique was maintained as far as possible.

The patients from whom the cerebrospinal fluid was taken were chosen from a large group at Manteno State Hospital. Each patient's case history was reviewed, and each patient was given a physiological and psychological examination designed to elicit catatonic phenomena (1, 2, 5). The criterion for including patients in the catatonic group was the presence of several of the following conditions:

A. Hypokinetic phenomena
   1. Diminished motor phenomena
      a. Greatly retarded impulse to movement and action
      b. Maintenance of a drooping posture or remaining motionless for long periods
      c. Muteness or stupor
      d. Mask-like facies
      e. Grimacing, grinning, gesturing
      f. Fixed, blank or directed vision
      g. Sluggishness or absence of corneal, feinting, light or accommodation reflexes
      h. Sluggish musculature
   2. Catatonic phenomena
      a. Maintenance of imposed positions for long periods of time
      b. Refusal of food, or need to be fed by others
      c. Refusal to dress or undress
      d. Drooling of saliva or incontinence of urine or feces
      e. Decrease or absence of reaction to pin prick
      f. Rigidity or flaccidity of body
   3. Physiological negativism
      a. Active negativism
      b. Passive negativism

B. Hyperkinetic phenomena
   1. Tremor
   2. Irregular hyperkinesis
      a. Unorganized activity, impulsiveness, combativeness, incontinence
      b. Stereatopy
      c. Active negativism usually marked

C. Autonomic phenomena
   1. Salivation
   2. Respiratory changes
   3. Acrocyanosis
   4. Hyperhydrosis, hypohidrosis or anhidrosis
   5. Menstrual changes
   6. Other abnormalities

Each patient received a physical and neurological examination, and was then classified according to the degree of hypokinetic or hyperkinetic features and whether his clinical course could be temporarily reversed with convulsant doses of hydrazides (14). All the patients were chronic schizophrenics of 6 to 25 years' duration, and their ages ranged from 24 to 51. There were no acute cases.

The control patients were mental defectives with subnormal intelligence quotients. The duration of hospitalization and ages of these patients were similar to those of the catatonics. All but two of these patients also had a diagnosis of psychosis.

The temperature of the experimental room was recorded and average 80° C. The temperature variation between tests was usually 1–2° C., but on one occasion it varied 9° C. The humidity was not recorded. The room was quiet, and any extraneous stimulation was constant. Only the experimenter entered the room to record data. Although the room was not light-proof, it was shielded from the direct

rays of outside light. A shaded electric bulb was lit constantly.

Holtzman albino male rats were used in the experiment. The average weight of the rats was 86 gm. with a range of 80–90 gm., and the average age was 34 days.

Two experimental procedures were used. In the preliminary experimentation each group of experimental animals was fed 10 gm. of food per day for 3 days and tested against animals receiving an injection of isotonic and hypertonic saline. The rats were observed for listlessness, loss of spontaneity, postural alterations and food and water consumption, and they were tested against DeJong's (5) catatonic criteria.

The results were not clear. In those rats injected with cerebrospinal fluid of catatonic patients the occurrence of "true" catatonic phenomena was minimal, and uninjected animals occasionally showed the same phenomena. The animals injected with cerebrospinal fluid did show a marked decrease in activity in comparison with the animals injected with isotonic saline, but a hypertonic saline solution caused somewhat similar changes. Consequently, it was felt that a more objective method was necessary for evaluating behavioral changes in the animals, and the following experimental design was substituted.

The animals were fed 10 gm. of food per day at the same hour for 3 days. Water was not limited. On the fourth day the animals were placed in a rat-activity wheel for 24 hours without food or water. The number of revolutions was recorded every hour for 10 hours; at 19 hours and at 24 hours. On the fifth day the animals were then removed from the activity wheels and fed 20 gm. of food. On the sixth day they were given 10 gm. of food. On the seventh day the animals were injected and again observed in the rat-activity wheel. Six animals were tested simultaneously. One rat received an injection of an isotonic saline solution; one received an injection of an artificially reconstituted cerebrospinal fluid solution; and four rats received patients' cerebrospinal fluid. Table 1 presents the data on the type of fluid injected into the rats.

TABLE 1.—Number of Rats Injected with Isotonic Saline, Artificial Cerebrospinal Fluid and Patients' Cerebrospinal Fluid

Type of Fluid Injected	Number of Rats Injected
Isotonic saline	7
Artificial cerebrospinal fluid	7
Patients' cerebrospinal fluid	
7 mental defectives	7
11 catatonic schizophrenics	14*
1 non-catatonic schizophrenic	1
1 catatonic schizophrenic with a history of lues	1
1 epileptic	1
	—
	38†

* Three patients from this group had repeat lumbar punctures.

† Rats once injected were not used again.

An artificial cerebrospinal fluid was used rather than a hypertonic saline solution in order to control for the hypertonicity of the concentrated cerebrospinal fluid because it was felt that this would be more similar osmotically. It had been observed in the preliminary experiments that the water intake was doubled with hypertonic saline in comparison with human cerebrospinal fluid. After the experiment was completed, an analysis of the artificial solution was prompted by the experimental results. A discrepancy between the human and artificial cerebrospinal fluid solution was found. The artificial solution consisted of the following:

Urea	260 mg. per 100 ml. fluid
Bovine albumin	250
Glucose	600
NaCl	4,500
KCl	200
$MgCl_2$	40
$CaCl_2$	200
Total solute	6,050 mg.
pH	5.0
Specific gravity	1.033

The NaCl should have been about 7,500 mg. per 100 ml., and the total solute equal to about 9 gm. in order to approximate cerebrospinal fluid that was 10 times concentrated.

Results

The accumulated pre- and post-injection revolutions were computed for each of the observed hours. A percentage increase or decrease in activity was recorded for each rat. White's (20) two-tailed rank test for the

TABLE 2.—Probability Values for the Difference in the Rate of Activity of Rats Prior to and Following Injection of Isotonic Saline, Artificial Cerebrospinal Fluid and Cerebrospinal Fluid from Catatonic and Mental Defective Patients

Fluid	Hours											
	0–1	0–2	0–3	0–4	0–5	0–6	0–7	0–8	0–9	0–10	0–19	0–24
Isotonic saline and artificial CSF	.05	.05	.05	.05	—	—	—	—	—	—	—	—
Isotonic saline and CSF from mental defectives	.01	.01	.01	.01	.01	.01	.01	.01	.05	.05	—	—
Isotonic saline and CSF from catatonics	.01	.01	.01	.01	.01	.01	.01	.01	.05	.05	—	—
Artificial CSF and CSF from mental defectives	—	.05	.05	.01	.01	.01	.01	.01	.01	.01	—	—
Artificial CSF and CSF from catatonics	—	—	—	—	—	—	—	.05	.05	.05	—	—
CSF from catatonics and mental defectives	—	—	—	—	—	—	—	—	—	—	—	—

— Not significant.

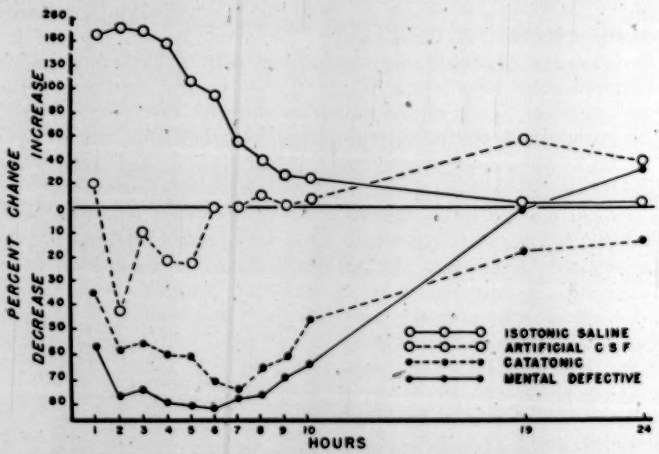

Fig. 1. Accumulated median percentage change in rat activity after injection of isotonic saline, artificial cerebrospinal fluid and cerebrospinal fluid from catatonic and mental defective patients.

significance of the difference between groups was used in computing the probability values listed in table 2.

The subcutaneous injection of hypertonic solutions is very painful. For 3 to 5 minutes after the injection the rat manifests a variety of signs, crying, licking of the wound, extreme agitation, convulsive and turning movements, autonomic phenomena and paresis. The rat then returns to what appears to be normal activity. In about 20 minutes marked lethargy ensues. The rat maintains a quiet and haunched posture, the hair stands up, and its reaction to stimuli is diminished. The length of this period is quite variable. Isotonic saline has none of these effects.

If the second hour is analyzed independently of the first hour (and there is some justification for this since the decreased activity begins about 20 minutes after the injection), there is a significant difference between the artificial cerebrospinal fluid and the catatonic group at the .05 level, and the mental defective group becomes significant at a probability value of .01.

Figure 1 presents the median percentage change in rat activity for the various groups per hour. If the mean values are computed, the values tend to be slightly higher but follow the median pattern. The median values are graphed because there was some variability in the individual values. For the first 10 hours only one of the animals injected with isotonic

saline showed a consistent decrease in activity; only one of the rats injected with cerebrospinal fluid from the catatonics showed an increase in activity; all the rats injected with cerebrospinal fluid from the mental defectives showed a decrease in activity; the rats injected with the artificial cerebrospinal fluid were quite variable.

Fluid from 3 of the catatonic patients was drawn a second time, injected into different rats which were again tested with the activity wheel. On inspection, the resulting curves were not similar. Since the fluid from 7 patients was used both in the preliminary and definitive experiment, a third check on the results was possible. No consistent trend was observed.

Nothing significant was found by comparing the hypokinetic with the hyperkinetic catatonics, or by comparing the reversibles with the non-reversibles, the ages of the patients, length of illness, physical and psychological state at the time of the lumbar puncture or any other pertinent factor.

There was no relationship between the change in activity and the analysis of the cerebrospinal fluids, the findings of which were all within normal limits. (The glucose determinations were discontinued half-way through the investigation.) All the rats recovered from the procedure.

Discussion

It seems apparent that most of the effect which was being measured was related to the hypertonicity of the injected solutions. It is likely that the effect of isotonic saline on the activity of the rats was minimal. These animals increased their activity in the post-injection run, and this can be attributed to their learning how to run in the activity wheel. The first effect of the hypertonic solution was immobilization owing to the painful injection. Although the pain apparently does not last more than 5 minutes, the residual effects of this trauma would have to be considered as a factor influencing later activity. More important, however, is the severe electrolyte imbalance which begins to take effect in about 20 minutes. With the excretion of a hypertonic urine the electrolyte imbalance is dissipated, and the activity of the animal increases. It is well known that water depletion will increase the activity of rats (7). At a certain point the depressed activity resulting from the extreme hypertonicity of the body fluids gives way to an increased activity caused by the drive for water. This is reflected in the later hours by the relative and absolute increase in activity of the rats injected with hypertonic solutions compared with the rats injected with isotonic saline. The latter dissipate their energy and do not have a strong drive to continue their activity. Another factor which has to be considered is that the early decreased activity may provide energy for later utilization. This may help explain some of the increased activity in the later hours but probably is not as important as the induced drive.

It has already been pointed out that the artificial cerebrospinal fluid was less concentrated than the human cerebrospinal fluid, and the greater electrolyte imbalance of the latter could explain the greater depression and the slower return to increased activity. In addition, the different pH and specific gravity, the more complex proteins and enzymes, other electrolytes and other unknown substances in the human cerebrospinal fluid would have to be considered.

During the first 10 (to 15) hours the activity of the rats injected with cerebrospinal fluid from the catatonic patients is less depressed than the activity of the rats injected with cerebrospinal fluid from the mental defectives. The mental defectives, however, seem to increase their activity at a faster rate, and at some time between the tenth and nineteenth hours surpass the catatonics. The median 24-hour total activity for the mental defectives shows an increase of 34.6 per cent, and the catatonics show a decrease of 13.6 per cent. The reason for this may be entirely fortuitous as indicated by the lack of significance between the groups. It is conceivable, however, that some immediate-acting substance is present in the cerebrospinal fluid of the mental defectives but not in the cerebrospinal fluid of the catatonics, and/or that some substance with a delayed activity is present in the cerebrospinal fluid of the catatonics but not in the mental defectives. It would be interesting to test the effects of concentrated cerebrospinal fluid on the activity of rats without the

interfering hypertonicity of the solutions. This would be a difficult biochemical problem but may form the basis for future research. It would also be interesting to introduce cerebrospinal fluid directly into the ventricles of animals, using the technique of Sherwood and Feldberg (17), for it is known that some substances are inactivated before reaching the brain or fail to pass through the blood-brain barrier in effective concentrations.

This experimentation differed from that of LeGrande and Année in four ways: First, the rat-activity wheel was used instead of mere observation. This was considered to be a more objective method of evaluating the results. Secondly, the cerebrospinal fluid was concentrated by lyophilization instead of by blowing air across the fluid. This method will preserve the activity of almost all known substances. It would be appropriate at this point to question the authenticity of the report that the active substance in the cerebrospinal fluid of catatonics is inactivated by cold. In fact, low temperature is a frequent method of preserving activity. Such a finding would be quite interesting to biochemists. It is possible that blowing air over the fluid could oxidize some substances which would then become active in some way. The third difference would be the use of another strain of rats. Finally, the criteria for the selection of the patients might have been different, but there is no way of evaluating this since the previous authors did not describe them fully. The mental defectives used in this experiment could have had the same metabolic abnormality present in the catatonics. Five of our mental defectives also had a diagnosis of psychosis. There is no justification, however, for exploring this or other points because the results are obscured and can be explained by the hypertonicity of the injected solutions. With the experimental procedure outlined above the results of LeGrande and Année could not be duplicated.

Several variables in this experimentation should be noted briefly. Temperature variations were observed by Browman (3) and Kindler (11) to affect the activity of rats. Interpolating from their data, however, it is probable that the temperature variations in this experiment were not large enough to affect the results. Analysis of the data for this influence was negative. Changes in humidity were probably not important because Kindler (11) has shown that humidity variations do not affect rat activity at the temperatures recorded in this study.

An observation that may be of interest to experimental psychologists is the effect of hypertonic saline on the activity of rats. This may provide a method of inducing a drive not previously tested. Finger (6) and Finger and Reid (7) have shown that water or food deprivation increases the total activity of the animal. The injection of hypertonic saline markedly diminishes the generalized activity of the animal but increases the drive for water. These animals will drink 3 to 10 times more water than controls injected with isotonic saline. This effect begins within 20 minutes after sucutaneous injection and almost immediately after intraperitoneal injection. Optimum effect was found to occur with an injection of 3 ml. of a 7.6 gm. per 100 ml. of solution per 100 gm. of rat. The effect is also present with a 4.5 gm. per 100 ml. solution but does not last as long. A 9 gm. per 100 ml. solution may result in complete paresis and death of the animal after a number of hours.

Summary

An experiment was designed to test the hypothesis that there is a catatonigenic agent in the cerebrospinal fluid of catatonic patients.

Concentrated cerebrospinal fluid from catatonic and mental defective patients, as well as an isotonic saline and an artificially-reconstituted cerebrospinal fluid solution, was injected subcutaneously into young rats. Performance of these rats in a rat-activity wheel was recorded for 24 hours prior to and after the injections.

Although the cerebrospinal fluid from the mental defectives depressed the activity of the rats more than the cerebrospinal fluid from the catatonics in the first 10 to 15 hours, and the catatonic fluid depressed the activity of the rats more than the mental defective fluid in the later hours, these differences were not statistically significant. There was a significant difference between the activity of the rats injected with isotonic saline, artificial cerebrospinal fluid and the human fluid in the early hours. Some time after 10 to 15 hours

there was no significant difference between any of the groups. The performance of the rats in the activity wheel was related to the hypertonicity of the injected solutions.

The mechanisms determining the different activity curves of the injected animals were discussed, as well as the variables and other difficulties involved in this investigation.

Our observations did not substantiate the hypothesis that there is a catatonigenic agent in the cerebrospinal fluid of catatonic patients.

I am indebted to Dr. N. A. Apter and Dr. C. C. Pfeiffer for their advice and encouragement during this study. I am also grateful to those who helped in various capacities at the University of Chicago and Manteno State Hospital, Illinois, where this research was done. The study was financed in part by funds from the Illinois Mental Health Fund and in part by the Geschickter Fund for Medical Research.

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SIMILAR ANTIPHLOGISTIC REACTIONS AFTER PREFRONTAL LOBOTOMY AND TREATMENT WITH CHLORPROMAZINE

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There is no doubt that we are still in the dark when it comes to explaining the beneficial and less beneficial results of newly developed psychiatric treatments. This refers to the mental and emotional changes as well as to the physical ones observed in the functional psychoses. We cannot account as yet for the increase in appetite and weight, the disappearance of circulatory and vasomotor disturbances, the peripheral cyanosis, the edema of the lower extremities and the endocrinopathic disturbances.

For quite some years, I was able to follow up patients who previous to prefrontal lobotomy were suffering for many years from otitis media, dacrocystitis, blepharitis, hordeolum and acne of face and chest. Many of these patients were treated for years in the ENT and Eye clinics with little improvement noticeable. The fact that all these physical ailments have disappeared without further treatment after prefrontal lobotomy and have not recurred since, makes one believe that there is a causal relationship between the deteriorating effect of the psychosis upon the patient's physical condition and the visible improvement as a result of the operation. Most of the patients mentioned underwent surgery several years ago but are still patients of the state hospital because their behavior and mental condition though improved do not warrant their release.

Lately in treating patients with chlorpromazine I was surprised to find clearance of acne of face and chest in a number of patients and in one of them an apparently complete recovery from otitis media, conditions which had persisted for many years.

It is a well-known fact that the weight of psychotic patients varies with the change in their mental condition. These weight changes are at times a fine indication pointing to improvement or worsening of the psychosis. Patients with a phasic course of attacks and remissions show this alternation in their condition by losing weight when going into an attack and gaining it back with an oncoming remission. Personnel working with psychotic patients have pointed to this phenomenon and have felt that the gain in weight indicated improvement while loss of weight was considered a cause of alarm. This concept seems to have the same unproved and yet visible prognostic value, for instance, as the disappearance and return of the menstrual cycle have in female psychotic patients. Why and how these irregularities occur is as yet unknown, but it has become part of the psychotic picture and has been only overshadowed by the more prominent psychogenic factors involved in all neuropsychiatric disorders.

W. B. Cannon in his book (2) has pointed out that even if he removed the sympathetic nervous system in animals, they were able to live a nearly normal life in a kind of restricted manner. Stanley Cobb (3) found that "in dementia praecox a general disquilibrium of the autonomic nervous system is common with cold bluish hands and feet, blotchy skin, widely dilated unstable pupils, cardiac acceleration and that dispepsia and diarrhea accompany fear while skin lesions and edema may occur with anxiety states." Even more recent research workers have pointed to the fact that what we call regression and deterioration in schizophrenic patients is based on the disorganization of the autonomic nervous system, which has its subcortical center in the hypothalamus. Since all vegetative functions are regulated by the autonomic nervous system, the above-mentioned irregularities as well as their improvement may depend upon this common denominator.

Silvano Arieti (1) writes that "inadequacy of the autonomic nervous system is seen in defective homeostatic reactions." And again, "The inhibition of the hypothalamus may explain the hypofunctionality of the autonomic nervous system as far as the homeostatic reactions are concerned."

Is it the hypothalamus in which all vege-

tative centers are localized, the autonomic nervous system itself, or is it the humeral metaboli which benefits by the therapeutic interception of a seemingly disorganized nervous circuit? We do not know now, but we shall know some time. At present we can only gather facts such as I want to present in this paper.

The following cases who were lobotomized some years ago have shown an apparently complete recovery from otitis media, dacrocystitis, recurrent hordeolum, vaginitis, and acne vulgaris, respectively.

The first case is that of a patient who, after a longstanding schizophrenic condition, showed mental and emotional improvement after prefrontal lobotomy and in addition a complete recovery from certain chronic infections. She is an American born white female patient 39-years-old with a negative family history. She was a normally developed child and an outstanding student, majoring in English, and was described as precocious and intelligent. Yet, she had few friends and did not seem to be interested in the other sex. The onset of her psychosis was sudden, and within six months she showed a full blown attack of schizophrenia with the characteristic symptomatology of mannerism, restlessness, peculiar and repetitious movements and extreme fear. Emotions were inadequate, thought content dissociated, auditory and olfactory hallucinations the most outstanding symptoms. She was not yet 20 when she was committed to a state hospital where, in spite of intensive treatment of electric and hypoglycemic shock, she remained unimproved and deteriorated to a very low level of existence. When prefrontal lobotomy was considered for her, the patient was completely out of contact, impulsively assaultive, self-inflicting, and dangerous to others because she would bite and kick when someone came near her. Her physical condition deteriorated with her mental one. She was a management problem, having to be spoonfed and tubefed.

Previous to prefrontal lobotomy the patient suffered for many years from bilateral purulent otitis media and was under the treatment of the ENT clinic from 1943 to 1951. There was a discharge, especially from the left ear, which was described as a "foul odor with eczema of both meatus." She also suffered from bilateral chronic blepharitis and frequent hordeolum. A purulent vaginitis had to be treated at frequent intervals.

In March, 1951, a bilateral prefrontal lobotomy was performed, and the patient showed an uneventful post-lobotomy course. She improved mentally and also in her behavior; her delusions still persisted but were more mild than formerly. She can now be kept on a quiet ward and shows interest in different activities, especially in the visits of her relatives.

The vaginitis has cleared up completely without further treatment; the otitis media has not shown any exacerbations and is asymptomatic since the end of 1951. No hordeolum has recurred after this time either.

The second case is that of a 35-year-old white American born female patient, the oldest of three siblings. A younger sister, who was said to have been dull normal, died in her early years after a fall while the patient was caring for her. The patient developed guilt feelings about her part in this sad incident. A brother is an outstanding professional man. The patient was said to have been a normally developed child and a good student until the age of 16½ when she became depressed, was unable to concentrate and had to leave school. Soon afterwards she refused to talk and started hitchhiking for long distances because of "an urgent impulse." She started to talk incoherently after being returned, refused to leave the house, and threatened to jump out of the window. She was admitted to a private sanitarium in May, 1937, where she was said to have been uncooperative, underproductive, blocked, irrelevant and repetitious. She responded to auditory hallucinations, was confused and apprehensive, dazed and bewildered. She had to be tubefed and was transferred to a state hospital in September, 1937. Her symptoms persisted in spite of intensive electric shock treatment to which she responded with moderate benefit, relapsing each time treatment was discontinued. She regressed to a very low level, had to be kept in camisole and restraint at frequent intervals, tubefed and helped in every way. Physically she deteriorated rapidly, was drooling constantly,

with a secretion of pus emanating from her nose, had a vaginal discharge, and was wetting and soiling. A chronic dacrocystitis and blepharitis developed with hordeolum on both eyelids which had to be treated regularly.

A prefrontal lobotomy was performed in January, 1954, and since then the patient has been cooperative, able to take care of her own needs, continent, does not require any type of restraint and has aquired good table manners. The vaginitis as well as the dacrocystitis and blepharitis has cleared up completely, and no hordeolum has recurred since.

The third case is that of a 40-year-old white female patient whose family history is negative. Her development was said to have been normal, though she only reached the sixth grade of grammar school. She worked for 18 consecutive years in a factory. Her prepsychotic personality was described as jolly and moderately outgoing. She married in 1935 and gave birth to a child by Cesarean section in 1948.

In 1944, while studying for an examination, she suddenly started to talk irrelevantly, felt that people made remarks about her, and worried about airplanes flying over the house. She cleared up completely and was well until the birth of her baby in 1948. It was then that she became mute, impulsively assaultive, and actively hallucinated. She was committed to a state hospital in January, 1949, where she made a poor adjustment and was described as confused, actively hallucinated and uncooperative. She received electric shock and insulin treatment with little benefit and through the years remained confused, expressed feelings of unreality and showed little tendency to improve either mentally or physically.

For years she used to complain about pain in her sinus and left ear, and examination by the ear specialist revealed a chronic otitis media with draining. According to the specialist, the condition remained resistant to treatment.

In July, 1952, a bilateral prefrontal lobotomy was performed on her. The post-operative course was uneventful. She became quiet and cooperative, usefully employed with periods of mild irritability and lack of initiative prevailing for quite some time. All her physical complaints stopped including those about her left ear and sinus; the draining stopped completely. She received 1 cc. penicillin for five days in August, 1952, for an upper respiratory infection but no further treatment. The patient was discharged from the ear clinic because on examination by the ear specialist the otitis media had cleared up.

The fourth patient whose chronic dacrocystitis improved after prefrontal lobotomy is a 55-year-old Russian born female who has been psychotic since 1923. She left the state hospital twice on convalescent care, only to return a short time later. She has been in the state hospital continuously since 1929.

She showed alternation of overactive and underactive periods with schizophrenic features present. During the overactive phases she was assaultive, actively hallucinating and insisting that an electric current was shooting through her body. She was a great management problem, disturbed and uncooperative.

A prefrontal lobotomy was performed in January, 1954. Since then she has been quiet all the time, cooperative and well behaved. She is in good contact, stating that the voices made her "upset and that now they are gone." She is a good and willing worker but shows some memory defects and a loss of the sense of time.

Since 1929 the patient had suffered from a chronic dacrocystitis with acute exacerbations causing inflammation and constant draining of purulent discharge of her left eye. An entropion developed which was operated on in 1951 and 1952, but the acute exacerbations with purulent discharge recurred even after the operation of the entropion. The condition was described by the eye specialist as follows: "Area over the left eye edematous and lacrimal sac draining. Induration in lower corner of the left eyelid. Diagnosis: Acute exacerbation of chronic dacrocystitis with possible blocking of duct." The physician in charge of the case previously and after prefrontal lobotomy reports that a short time after the operation in January, 1954, the purulent discharge stopped completely and no exacerbation has recurred. She noted that previous to prefrontal lobotomy the dacrocystitis would become acute during the patient's disturbed periods, while

discharge and injection would eventually stop during her quiet ones.

The following case is that of a 44-year-old white female patient who has a history of twice falling out of a moving car in early years with no evidence of head injuries. She had a normal development, was a good student, married at the age of 20, and was deserted by her husband after giving birth to her only child, a daughter. She became an office worker and brought up her baby until 1939 when she showed the first overt signs of her psychosis. She quit work, was lying around all day long, neglected her child, became withdrawn and unresponsive. She returned to her mother and suddenly became hallucinated and disturbed. She developed paranoid delusions, was admitted to a state hospital in 1939 with a continuous residence up to the present time. The patient regressed rapidly, became very assaultive, destructive, untidy, and a danger to her surroundings. She received electric shock treatments without benefit, remained unmanageable, hitting, biting, spitting and kicking like a wild animal. In December, 1951, a bilateral prefrontal lobotomy was performed on her. She improved, is now pleasant, quiet and cooperative all the time, very helpful, somewhat elated, but neither assaultive nor destructive. Prior to prefrontal lobotomy the patient has suffered from recurrent hordeolum of both eyes as well as acne of face and chest. She showed phaneromania which caused new exacerbations, and she was nearly constantly under treatment for these conditions. Since prefrontal lobotomy was performed, no hordeolum has recurred, and acne of face and chest has disappeared without further treatment.

The two last cases are patients who after prefrontal lobotomy showed a remarkable improvement of a longstanding acne vulgaris. Both are white female patients, one 33, the other 49-years-old. The first one has been hospitalized since 1944; the second one, since 1935 with the diagnosis and symptomatology of schizophrenia. The first one was lobotomized in 1950; the second one, in the beginning of 1953. Both showed mental and emotional improvement as well as physical improvement and a complete disappearance of the acne which persisted for many years. There are still some pits present as witnesses to their former condition, but no new exacerbations have recurred in either patient or in some others where similar improvement of a chronic infection took place after prefrontal lobotomy.

Amazing as these observations may have been following prefrontal lobotomy, the fact that conditions such as otitis media and acne vulgaris cleared up also after treatment with chlorpromazine, points to a common denominator which apparently brings about the same effect in these two types of treatment.

The case of otitis media which became just as asymptomatic after treatment with chlorpromazine as the one described after prefrontal lobotomy is that of a 25-year-old Puerto Rican born female patient. Her early development was normal, she was graduated from public school at 14, and came to the United States in 1948 to look for work. At the end of 1948 she showed the first overt signs of a schizophrenic psychosis, became afraid she would kill somebody, saw dead people lying on the floor, and changed from a semi-stuperous condition to excitement, dancing and singing the whole day without being able to eat or sleep. In the middle of 1949 after a tonsillectomy, she became actively hallucinated and had to be hospitalized. Electric shock treatment had to be interrupted after 17 treatments because of an acute attack of otitis media which she had suffered for quite some time. She was released from the hospital and discharged a year later. In 1953 she had to be readmitted because she became suddenly confused, hostile, illogical, and withdrawn. She received electric shock and insulin treatment with little benefit. All during her hospitalization she complained about much pain in her left ear, was treated by the ENT clinic for persistent discharge from her left ear.

From March, 1955, to April, 1955, for more than one month she received 100 mgm. chlorpromazine three times a day to which she responded immediately. She improved considerably and has since been released from the hospital. Subsequently, all pain and discharge have ceased even though she no longer gets treatment for her otitis media. In June, 1955, she was seen by the ear specialist in order to confirm our observation. He stated: "Both drums perforated. No pus at present time,

no mastoid tenderness. In the absence of discharge or pain or symptoms of infection no indication for treatment."

The following case is a 41-year-old white American born female patient who completed school at 18, met her husband and got married the same year. She gave birth to four children. The family was always financially and socially well off. About 10 years ago the patient was raped by a neighbor, and from that time on their married and family life seemed to deteriorate. In the middle of 1954 the marital discord apparently reached its peak, and the patient fractured her left arm in a struggle with the husband. She became deeply depressed, seemed more or less in a fog and attempted suicide. Religious delusions, preoccupation and seclusiveness were in the foreground of her psychotic condition. Since the fracture healed poorly and bone graft had to be instituted, electric shock treatment could not be applied. The patient received chlorpromazine treatment 100 mgm. three times a day for two months. She improved considerably and has since been released from the hospital.

For more than a year previous to her hospitalization, acne of the face, which persisted for some time, became more prominent. The patient became concerned about it and consulted a physician. In spite of treatment the acne did not clear up, and this added to the patient's depressive trend. After chlorpromazine treatment, the acne of the face disappeared completely and did not recur until her convalescence after the patient left the hospital.

Among some cases of acne vulgaris which disappeared after treatment with chlorpromazine, I have chosen three because of their chronic condition.

The first case has a tainted family history. A younger sister has been psychotic and hospitalized though at present she is living outside the hospital. Our patient has suffered since childhood from asthma and bronchial congestion which, as it often happens, eased during her psychotic attack. She lived a rather secluded and sheltered life, finished two years of high school and developed paranoid ideas in the middle of 1950. She quit her job, stayed in bed and would not talk. She also complained about some sounds which were transmitted to her. She was hospitalized for the first time in 1951 because she insisted that people were using radar on her, saw all her movements and called her names. She was described as preoccupied, inattentive, uncooperative, underproductive and confused. She received electric shock treatment and took part in group therapy in a rather passive way. She developed auditory hallucinations and fainting spells. Chlorpromazine treatment was instituted in April, 1955, and continued through June, 1955. She received 300 mgm. daily, became more alert and interested in her surrounding, better accessible, less confused and less preoccupied. Some delusions persisted but did not seem to annoy her as much as previously. Acne of face and chest which she had had for many years disappeared completely, a fact which was observed by nearly everyone who took care of her. Her mental condition after discontinuation of chlorpromazine treatment has since relapsed, but her acne has not recurred.

The following case is noteworthy because the 34-year-old white American born female patient suffered from a severe case of acne vulgaris for many years. The first statement about this condition in her history stems from 1944 where a note on her physical examination sheet says that "her physical condition was essentially negative except for acne of her face." Photos at the time of her admission to the state hospital show more or less clearly the acne of her face. Since then the condition has never cleared up, but new efflorescences arise constantly and are treated locally. In 1951 she received penicillin for another ailment, yet the acne of her face did not clear up.

This patient has a tainted family history, for a maternal aunt was once hospitalized for a nervous condition. Patient herself had convulsions between the ages of four and six. The younger of two children she was described as an intelligent and artistically gifted child who after finishing high school attended art school where she studied painting. The first change in her personality was noted in 1940 when she lost sleep and appetite, became irritable and suspicious, turned against her family and left home in order to live with a boy friend. She changed jobs constantly, and

in 1943 her condition deteriorated to the point that she had to be hospitalized. She was restless, responded to auditory hallucinations and escaped from the hospital one month later. She had to be returned in a few days and continued to be a resident of the hospital. She received electric shock treatment, was placed on convalescent care, only to be returned a few months later as having relapsed. Her condition remained unimproved until July, 1955, when chlorpromazine treatment was started. Since she refused medication orally, 100 mgm. were applied intramuscularly twice a day for about one week, at which time she had improved sufficiently to take medication by mouth. She received 100 mgm. twice a day which was later reduced to 25 mgm. twice a day because of her mental and physical improvement. The acne of her face disappeared completely, but some marks and pits are still visible though no new efflorescences have recurred since chlorpromazine treatment was instituted.

The last case to be described is that of a 40-year-old white American born female patient, whose father died when she was four years old. She was taken from one boarding school to another, finished grammar school and went to work at the age of 12. Her prepsychotic personality is described as likable with interest in religion and friends. She married at the age of 18, has two children, was unable to get along with her husband and divorced him. In the beginning of 1947 she suddenly became fanatical, visited the priest frequently, insisting that people were watching her, started to talk incoherently and had to be hospitalized. She received electric shock treatment, improved, was released and discharged a year later. She worked in factories, started to drink heavily, stopped working and sat at the window the whole day because she asserted "it was good for her complexion," which at this time already showed acne of face, neck and chest. She had to be re-hospitalized in 1950 and has been a resident of the hospital ever since. At first she received 100 mgm. chlorpromazine three times a day from May 22, 1955, and later twice a day, until it was discontinued on June 18, 1955.

The patient has suffered from acne vulgaris for many years with frequent exacerbations. Marks and pits of healed efflorescences are still visible. Despite the fact that she has received chlorpromazine only for a relatively short time, the old efflorescences have disappeared and no new ones have been observed.

Even if we cannot maintain that prefrontal lobotomy or chlorpromazine treatment have helped all patients to improve, we can say that both psychiatric treatments have stimulated physical activities in patients treated. The excessive gain in weight in patients, after prefrontal lobotomy was performed on them, has not been observed after chlorpromazine treatment. But the patients usually gain in weight after this treatment, the tonus of their skin improves, the eyes brighten up, the pupils become more stable, the peripheral cyanosis and edema disappear even in the more regressed and deteriorated patients. There is a decided improvement in the general feeling of well being, and patients express this fact frequently by stating: "I feel so much better than I felt before," or "I feel better all over," without being able to account for this feeling of improvement.

As mentioned previously, this paper has been concerned only with the similar beneficial effect of prefrontal lobotomy and chlorpromazine treatment upon chronic infections, such as otitis media, dacrocystitis, blepharitis, hordeolum, vaginitis and acne vulgaris, observed in quite a number of patients. All these conditions cleared up completely after these psychiatric treatments without additional treatment.

There has been no mention made of these observations in the literature so far except in Silvano Arieti's book "Interpretation of Schizophrenia." The author mentions the following facts about inflammatory conditions: "Some of the cortical hormones (discharged by the adrenal cortex) are prophlogistic, that is they enhance the inflammatory potentiality by stimulating the proliferative ability and the reactivity of the connective tissue. Other corticoids are antiphlogistic, inasmuch as they inhibit the production of granulomatous tissue and other facts of the inflammatory process."

It may well be that the adrenal antiphlogistic corticoids are the common denominator stimulated by the two types of psychiatric

treatments and thus are responsible for their amazing effect upon chronic inflammations.

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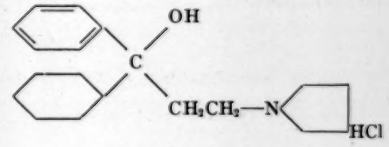
KEMADRIN,[1] A NEW DRUG FOR TREATMENT OF PARKINSONIAN DISEASE

PHILIP F. LERNER, M.D.

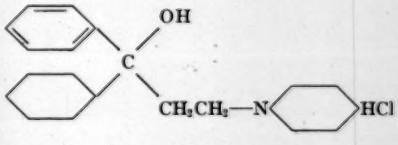
Therapy in Parkinsonian disease is becoming more and more a challenge to the physician because of the increasing number of cases of this illness. In 1950 the American Academy of Neurology estimated that there were at least one million cases under treatment in this country and noted that each year there has been a sharp increase in reported cases. The increasing lengthening of the span of life since the beginning of this century and the increasing occurrence of encephalitic and other diseases attacking the extrapyramidal nervous system are certainly factors in this increase of Parkinsonian sufferers. It is therefore imperative to search for new and better drugs to add to our armamentarium of therapy and to stress the need for necessary associated psychotherapy and physiotherapy, both of which have so often been neglected.

During the last decade there have been a number of new synthetic drugs which have helped a significant percentage of Parkinsonian patients. Yet, none has approached satisfactory control by itself or in combination with other chemotherapeutic agents, and there is still need for further study and search for a substance that will better control the tremor, the akinesia, and the other disabling signs of this disease. As a result of such a search, a new drug has been synthesized and employed in the treatment of Parkinsonism with promising results.

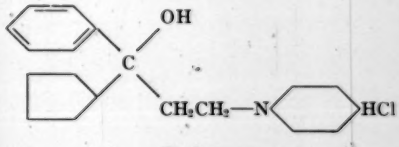
This drug, Kemadrin, is procyclidine hydrochloride, a spasmolytic related closely to Artane and Pagitane but having a pyrrolidine ring of four carbons and one nitrogen at one end of the molecule instead of the piperidine five carbon and one nitrogen ring. A further difference from Pagitane is that Kemadrin, like Artane, has a saturated six carbon ring at the other end of the molecule whereas Pagitane has a five carbon saturated ring. A comparison of these chemical formulae follows:



Kemadrin



Artane



Pagitane

The drug, Kemadrin, a white crystalline substance, soluble in water, stable at normal temperatures, and almost tasteless, was produced by chemical modification of antihistamines. Pharmacological testings show that it has an atropine-like action, producing antispasmodic effect on smooth muscle, inhibition of salivation, and moderately potent mydriasis. However, it is only about $\frac{1}{25}$ as active as atropine in inhibiting salivation and in producing mydriasis. Furthermore, the mydriasis produced in test animals is of significant shorter duration with Kemadrin than with atropine. The drug in fairly large doses does not cause any blocking activity of sympathetic ganglia and little or no effect on blood pressure, respiration, or blood picture. In the human, in doses ranging from 10 to 60 mgm. daily, administered orally, only occasional dryness of the mouth and mydriasis

[1] The Kemadrin used was supplied by Burroughs Wellcome and Company, Inc. (U. S. A.). It is now available for distribution.

have been noted. No disorientation or drowsiness occurred in the author's series of cases, but other workers have noted such symptoms occasionally with moderate dosages. In one of our cases, that of a 5½-year-old mentally retarded child, increase in akinesia and confusion occurred following addition of small doses of Kemadrin to his other spasmolytic medication; these symptoms, however, were minimized rapidly on withdrawal of the new drug, and the patient returned to his former status within a few days.

The author has employed Kemadrin now in 30 patients from hospital clinics and from private practice. All of these patients' Parkinsonism can be classed as moderately severe to very severe, and were of 2 to 20 years' duration. All had been on previous medication, for the most part in combination rather than on single spasmolytic agents; and all on required dosages, sufficient to produce annoying and uncomfortable side effects, especially mydriasis and dryness of the mouth. In two cases, Kemadrin, introduced in therapy by gradual substitution, was not too effective when the other medications were completely eliminated; but, following requests by the patients, when their original medications were once more given without reducing the dosage of the Kemadrin, very satisfactory and gratifying symptomatic relief of spasticity especially was obtained. Patients who had been adequately controlled on other therapeutic agents without associated distressing or too annoying symptoms were not used in this series.

The drugs used in combination with the Kemadrin were Artane, Hyoscine, Pagitane, Cogentin, Stramonium, Parsidol, Thephorin, Panparnit, and Dexedrine. Sixteen of the patients in this series were on combinations of Kemadrin and Artane with or without additional doses of Hyoscine and/or Thephorin. Six were on combinations of Kemadrin and Pagitane, and three of these were also on moderate doses of Hyoscine and Dexedrine. The remaining eight were on combinations of Kemadrin with one or more of the other medications named above.

The average dose of Kemadrin that is employed now is from 30 to 40 mgm. daily. When first used the drug was used in much smaller doses ranging from 2½ to 5 mgm. three to four times daily with only slight to moderate improvement, but as we increased the dosage in all but 11 patients, definite improvement was noted subjectively and objectively. Furthermore, it was possible to reduce in many cases the doses of the other spasmolytic atropine-like agents and, therefore, reduce considerably the distressing and annoying side effects complained of so often by these patients. It was noted also that many cases with associated depression were benefited markedly by what appeared to be a cerebral stimulating action; in almost all of these patients there was a concomitant emotional elevation in mood. No special objective testings for evaluation of effect were done in this series as Schwab, and coworkers (4, 5) had done in theirs, but the patients were able to increase their activities and accomplish with much more ease tasks which could be done only with difficulty or not at all. The opinions of relatives and friends as well as those of the patients themselves were used for additional assessment values. Considering all these factors in evaluation, in our series of 30 severe Parkinsonian sufferers, 21 obtained moderate to good relief with the use of this new agent, Kemadrin, in combination with other drugs; seven were not benefited at all, and two were apparently made worse. Where benefited, the improvement was most marked in decrease of rigidity, increase in activity, and ease of performance of usual tasks; secondly, in favorable response of alertness, speech improvement, and elevation of mood; thirdly, in decrease of tremors; and finally in reduction or minimizing of the annoying and uncomfortable side effects of the other drugs when used alone in previous dosages.

Case 1: This 34-year-old female has been treated in the outpatient department of the Mercy Hospital in Baltimore since early 1950. Past history reveals that at the age of two to three years she was hospitalized at a contagious disease hospital whose records reveal that she suffered from meningoencephalitis, complicating measles. At the age of 14 she developed the extrapyramidal symptoms of Parkinsonism, and these symptoms increased gradually in severity until she could not walk by herself and had to have assistance to come to the clinic. Treatment at first consisted of combination of Artane and Hyoscine, and later addition of Thephorin, but this medicinal regime had to be discontinued because it made her "sick" with objective

signs of agitation, depression, moderate confusion, and extreme dryness of mouth. She was finally better controlled with use of moderate dosages of Stramonium and Dexedrine, but periodically she developed episodes of "light-headedness," associated with increased spasticity, depression, and tremor. About 2½ months ago Kemadrin was added to the same dosages of Stramonium and Dexedrine with fairly rapid, marked subjective and objective improvement, especially as regards gait, speech, use of her arms, and mood. She has become, in this short time, a more cheerful and confident individual exhibiting interest in her personal appearance to a degree that she appears almost another individual. The dosage of Kemadrin has remained small, not over 5 mgm. t.i.d.

Case 2: This 61-year-old male has had severe Parkinsonism at least since 1951. He had been treated at another hospital since the onset of his symptoms with moderate doses apparently of Hyoscine and Artane, but he obtained little or no relief. He has been unable to continue his work as a bookkeeper since early 1954. Treatment with the same medications, but in increasing dosage plus Thephorin, 25 mgm. t.i.d., was continued with very slight improvement only. Four months ago he was placed on Kemadrin, starting with 5 mgm. b.d. and increasing gradually until now he is taking 10 mgm. q.i.d.; the other medications were continued (Artane 30 mgm., Thephorin 75 mgm., Hyoscine 4/100 gr.-daily in divided doses) without any disturbing side effects. He has shown very definite improvement objectively, especially as regards spasticity, writing ability, gait, and tremor, and although he states that at times he feels badly, he has lost his appearance of depression which was quite marked previously.

Case 3: This 68-year-old female, with very severe Parkinsonism dating back to the age of 51 years, came under treatment in December, 1947. No history of encephalitis was obtained. When her symptoms first were noted, she was told by a neurosurgeon that she had "a condition which occurs occasionally in older people," and she was placed on Hyoscine. However, this resulted in considerable giddiness and confusion, and the dosage had to be reduced to an almost ridiculously low level. Since latter 1947, she has been on slowly increasing dosage of Hyoscine, in combination at various times with one or more of other drugs (Benadryl, Dexedrine, Stramonium, Artane, Panparnit, Pagitane, Parsidol, Thephorin, Cogentin) with some control of the tremor but not of the spasticity. The rigidity became so severe that she had become completely incapacitated 1½ years ago. Depression, confusion, and at times delirium occurred with the use of these medications, necessitating frequent juggling of dosages and combinations. Akinesia was slowly progressive although from time to time the rigidity seemed lessened with certain combinations and dosages, but such improvement was temporary only. In June, 1955, when Kemadrin was added to therapy, the Parkinsonism had progressed to the point that she had to be dressed and carried to her chair. Original dosage was 5 mgm. t.i.d., but this has been increased so that now she takes 10 mgm. five times daily. Reduction and then elimination of Hyoscine, which seemed to cause the most disturbing side effects to the patient, were accomplished. In addition to the Kemadrin she is now taking 5 mgm. of Artane q.i.d., 5 mgm. Dexedrine Sulphate b.d., and 2.5 mgm. Pagitane q.i.d. She continues to show definite improvement in speech, tremor, alertness, and mood although the other objective Parkinsonian symptoms are still quite marked. Her gait is still difficult, but her husband believes that improvement has occurred even in this because she can now walk with help to her chair rather than be carried there.

Case 4: This 6½-year-old boy, said to be a normal delivery, developed severe measles complicated by encephalitis at the age of two. Shortly thereafter, he had what was said to be a fairly mild case of scarlet fever, but almost immediately be started to develop signs of rigidity and tremor which progressed rapidly. He was seen in February, 1953, at the age of four years, at which time there were marked unsteadiness in gait, frequent falling without loss of consciousness, marked spasticity and generalized tremor, obvious mental retardation with extreme changes of mood from pleasantness to excited irritability. Electroencephalogram done at that time was reported as being "a normal sleep pattern." He was placed on Artane with increasing dosages until he was taking 5 mgm. in the morning and at bedtime and four doses of 2 mgm. each during the rest of the day. Dexedrine was added in small doses but because of increased restlessness was discontinued after a short time. About 2½ months ago there were added to therapy small doses of Kemadrin, but since he developed increased confusion and an increase in falling tendencies, the drug had to be discontinued. These symptoms decreased rapidly after discontinuance, and he has been maintained on Artane and Thephorin. Further trial of Kemadrin in small doses was suggested but was not done because of reluctance and fear on the part of the patient's father.

Case 5: This 47-year-old upholsterer was referred in January, 1955, exhibiting rather marked Parkinsonian symptoms of spasticity, tremor, difficulty in gait with dragging of the right leg and increasing difficulty in using his hands in his work. He was placed on Artane and Hyoscine but shortly became confused, drowsy, and actively hallucinatory. The Hyoscine was discontinued, and these symptoms disappeared; the Artane was gradually increased from 2 mgm. q.i.d. to 5 mgm. q.i.d. with both objective and subjective improvement. About five months ago he was placed also on Kemadrin starting with 2½ mgm. t.i.d.; this dosage was gradually increased until now in addition to the 5 mgm. Artane q.i.d., he is taking 10 mgm. of Kemadrin t.i.d. The patient has improved remarkably in all respects and is now able to continue with his usual work activities.

Conclusions and Summary

Kemadrin, a new synthetic spasmolytic agent, has been used for periods of three to seven months in combination with other drugs in a series of 30 severe Parkinsonian patients. Twenty-one of these patients showed significant improvement, especially in regard to decreasing rigidity, increasing ability in accomplishment of usual activities, and elevation of mood and alertness. There were very little untoward symptoms with the use of this agent; rather it was possible by decreasing the dosage of the other drugs, in more than half the cases that were improved, to reduce annoying dryness of the mouth, mydriasis, drowsiness, depression and confusion which had complicated the treatment in most of the patients in this series. Twenty of these Parkinsonian sufferers were either of the post-encephalitic type or of unestablished etiology, and 10 could be classified as arteriosclerotic or pre-arteriosclerotic. The choice of patients in this series was based on severity of symptoms and inadequate control of symptoms with the other usual medications employed in the treatment of this illness.

Kemadrin is procyclidine hydrochloride and is closely related to Artane and Pagitane. Its therapeutic effects are similar to those of these drugs, but it has considerably less untoward reactions in doses up to 40 to 50 mgm. daily, even without decrease in dosages of the other drugs used in combination. This new drug, Kemadrin, shows promise of definite value in the armamentarium of the physician in the treatment of Parkinsonism, especially in those cases which have not responded favorably to other drugs.

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SOCIETY PROCEEDINGS

THE NEW YORK ACADEMY OF MEDICINE, SECTION ON NEUROLOGY AND PSYCHIATRY, AND THE NEW YORK NEUROLOGICAL SOCIETY

Joint Meeting, November 14, 1955

George H. Hyslop, M.D., President, New York Neurological Society, Presiding

PRESIDENTIAL ADDRESS: WHAT MAKES A CLINICIAN. DR. GEORGE H. HYSLOP.

FAILURE OF CONDITIONING IN PATIENTS WITH CEREBRAL LESIONS. DR. LOUIS BERLIN AND DR. HAROLD G. WOLFF.

A complex conditioned reaction dependent upon cerebral hemisphere function was studied to clarify whether a particular part or the whole cerebrum is involved in the conditioning process and to ascertain to what extent the degree of impairment of function is related to the mass of tissue loss. The subjects were 50 persons with intact cerebral hemispheres and 23 with cerebral hemisphere lesions. Of the latter, 11 had one circumscribed lesion of known dimensions and location, six in the frontal lobe, three in the temporal lobe, and two in the occipital lobe.

The conditioning procedures aimed at establishing a stable positive conditioned response to a tone; then negative conditioned responses to a light and calibrated tones, and finally at carrying out the negative and positive conditioned reactions in sequence. The results of the procedures were as follows:

The subjects with cerebral hemisphere damage had difficulty in predictably relating a symbol to a significant event. Even after experiencing a positive or negative integrated reaction, individuals with hemisphere damage had difficulty in stabilizing such a reaction, but once having established and stabilized a positive conditioned response to a tone, those with cerebral damage could then more readily establish a second positive reaction to a different tone. The subjects with intact hemispheres and those with hemisphere lesions readily achieved differentiation between positive and negative conditioned stimuli when qualitatively different stimuli were employed. But subjects with damaged hemispheres had the greatest difficulty in maintaining stable negative and positive conditioned reactions when two or more stimuli previously linked with stable negative and positive responses were presented in sequence. In subjects with cerebral damage, repeated failures disrupted previously stable conditioned reactions.

Regardless of the site of the hemisphere damage, the difficulties in establishing stable positive and negative conditioned reactions were the same, but the difficulties were proportional to the amount of hemisphere damage, to the complexity of the higher adaptive requirements, and probably to the rate at which the damage occurred.

Discussion.—DR. HANS-LUKAS TEUBER: The authors are studying cases of disordered cerebral physiology in order to elucidate some of the normal bases of conditioning and learning. They are thus adopting an approach so far used in only a few laboratories, and one that yields information which can go well beyond the clinical situations in which it is established. The conclusions reached by Drs. Berlin and Wolff need not be restricted to their conditioning methods, nor to the kind of cases they have studied. Other forms of learning, tested in the presence of rather more focal lesions, give essentially the same results.

Our own findings, though gotten with very different subjects, and with different methods, are quite consistent with those of Drs. Berlin and Wolff. We are working not with cases of tumor or vascular accident, but with cases of penetrating gunshot wounds of the brain, and we are employing not conditioning, but various perceptual tasks. For instance, in some of the recent work in our laboratory, men with missile wounds of the brain, as well as control subjects, were taught to identify, by touch, two-dimensional geometric patterns. Repeated trials were made with each hand, and a curious result emerged: men with missile wounds in any lobe of the brain (regardless of location of injury) failed to show significant learning with the hand opposite to their injury; with the hand ipsilateral to the injury, they did nearly as well as the controls. The deficit in tactile pattern learning was thus contralateral to the injury, but not restricted to any lobe; furthermore, the deficit existed regardless of whether the hand considered did or did not show sensorimotor deficits, otherwise established. The brain injuries in our patients had been incurred, on the average, 10 years prior to testing; nevertheless these men still show a subtle but significant alteration in acquisition of perceptual discriminations.

DR. ROBERT S. MORROW: I should like to address myself to two aspects of this very interesting study. The first of these concerns the relationship between brain structure and function. Research and clinical experience have now indicated to us that the so-called higher functions of intelligence, memory, reasoning, learning, etc., are dependent much more on the relationship between the degree of complexity of the activity and the extent of the brain lesion rather than its site. The more simple and well-learned tasks, such as vocabulary, are relatively unaffected by brain damage in adults, while the more complex functions, such

as complex conditioning processes in contrast to simple ones or new learning in contrast to old, show profound impairment effects with sizeable lesions. The current study of Drs. Berlin and Wolff gives further support to those theories of brain function which correlated the complexity of function with the amount of structural brain damage rather than the formerly advocated correlation of function and locus of lesion.

DR. HAROLD G. WOLFF: It is appropriate to discuss the orientation of our laboratory pertaining to the experiments having to do with cerebral function. These have been in process for some time, and will probably continue a good while longer. Neurology rightfully emphasizes the specific functions of parts of the nervous system, including portions of the cerebral cortex. The contributions of the neurosurgeons have done much to increase our understanding of such localization of function. There is a highly predictable relationship between the site of electrical stimulation of the cortex, and various kinds of somatic and visceral effects. Indeed, much of our bedside procedure for localization of lesions of the brain has to do with this kind of relationship between parts of the cortex and function. It is time to ask again the question: is this really what the brain is about? Is the brain really like the cord in that anterior horn cells and a limited number of muscle fibers are connected? Under what circumstances, and where, does learning, retention, discrimination, and abstraction take place? These are involved when we are talking about the highest integrative functions. With such questions in mind, we started on this series of experiments. At the moment it looks as if localization as regards learning, abstraction, retention and discrimination is not precisely limited to any one part of the cerebrum, and that a loss in these functions is more related to the loss of brain tissue generally than it is to brain tissue in any one part.

DIAGNOSIS OF BRAIN TUMOR IN 25 PATIENTS INITIALLY TREATED AS PSYCHIATRIC PROBLEMS. DR. J. LAWRENCE POOL AND DR. JAMES W. CORRELL.

Twenty-five cases of histologically verified brain tumor, all initially treated as psychiatric patients, have been studied in an effort to determine if earlier tumor diagnosis might be possible. All but 4 of the patients received psychiatric treatment for over one month, and 12 were treated for over one year. Fourteen had received electric shock (EST) treatment and 11 psychotherapy alone. The most frequent diagnosis (14 patients) was some form of depression, but other diagnoses included schizophrenia, behavior problem and hysteria.

Fifteen of the 25 patients presented signs and symptoms of organic disease of the central nervous system prior to psychiatric treatment, and two patients within a few hours after the first EST (although treatment was continued—in one case for three years). All the remaining patients except two showed some evidence of an organic brain lesion before psychiatric treatment was concluded. The symptom or sign of organic disease of the central nervous system most frequently unrecognized or not considered significant was a convulsive disorder (13 cases), most often psychomotor in type, and frequently associated with components of a temporal lobe syndrome. Other definite symptoms of an organic lesion presenting early in the course of these patients included headache, hemiparesis, diplopia, hearing loss and tinnitus, and progressive memory impairment associated with incontinence of urine. Memory impairment alone was considered an indefinite symptom, as was "depression", confusion, or extreme fatigability. Laboratory studies, such as plain x-rays of the skull and an EEG, when done, more often than not revealed evidence of an organic lesion.

Ten of these patients were found to have a benign nonglial tumor and only 5 of these are living and well today, having been relieved of both neurological and psychiatric symptoms by surgery one to seven years ago. Of the remaining 5 patients, one with an easily removable right frontal meningioma died during EST without surgery, and in the others the tumors (2 sphenoid ridge meningiomas, 1 acoustic neurinoma, and 1 craniopharyngioma) were too far advanced to gain more than temporary benefit from surgery, although the 2 with sphenoid ridge meningiomas (each with a 13 year history) had about two years of relief before recurrence. Three other patients died without surgery, one having an unrecognized oligodendroglioma confined to the non-dominant temporal lobe, and the other two each having a glioblastoma. It is apparent that early diagnosis would have allowed appropriate treatment of those patients who died without benefit of surgery, and might have made possible complete removal of the sphenoid ridge meningiomas and the acoustic neurinoma, while the best results in the treatment of the craniopharyngioma and glial tumors would have been obtained.

In view of these findings it would seem that when a psychiatric syndrome does not fit clearly into some definitely known disease entity, as Sands has pointed out, or when seizures, temporal lobe symptoms, headaches, or neurological symptoms are elicited in the history, every effort should be directed towards excluding an organic brain lesion and in particular, a brain tumor.

Discussion.—DR. IRVING J. SANDS: We are indebted to Dr. Pool and Dr. Correll for bringing before us this very important subject. Their presentation and their cases speak more eloquently and more convincingly than I can of the importance of an early diagnosis in these patients. I became interested in the subject some 35 years ago, when I was in charge of the department of pathology at the Manhattan State Hospital on Ward's Island. I had found so many organic changes, such as tumors, hemorrhages, etc., in brains of patients who had died with the diagnosis of a pure psychogenic condition that I became convinced of the entity of neuro-psychiatry, and that neurology and psychiatry were just different phases of the same thing, just like the two sides of a penny.

DR. JAMES P. CATTELL: I will certainly second Dr. Sands' commendation of the fine paper Dr. Pool and Dr. Correll have given us. This is a very stimulating topic worthy of a whole day's seminar, and perhaps one can be organized some time. I think we should wonder whether there has been sufficient attention

given to the fact that the human organism has limited possibilities of response. The human organism is very flexible, but the possibilities of response are limited.

We must exercise care in attributing all previous psychiatric difficulties to some organic lesion. There may or may not be a relationship. Psychiatric illness does not produce immunity to organic brain disease and the converse also is true. Either may be present separately, successively, or simultaneously.

DR. LUTHER B. KALINOWSKY: I just wish to express the hope that Dr. Correll and Dr. Pool will publish these cases with summaries of each case, so that we can study the details of the 25 cases, because they touch on basic problems in psychiatry.

Being interested in the possible localization of mental symptoms I would like to ask if there were any tumors of the midbrain or third ventricle which showed psychiatric manifestations.

DR. LEWIS D. STEVENSON: I may be out of order, but I would like to ask a couple of questions. First of all, I think the cases presented by Dr. Correll and Dr. Pool cannot have been studied in very good clinics. My question is, how many of these psychiatric syndromes were cured by operation, and second, how many cases of psychoses developed following operation, particularly on the benign meningiomas.

DR. J. LAWRENCE POOL: As to whether we have seen psychotic symptoms develop after brain surgery, I do not recall any offhand.

Dr. Stevenson, the clinics were not all good clinics; on the other hand, a few of these patients came from very good clinics and very good institutions, so that these oversights do not lie with any particular person or group. My only plea is that many of these patients who were institutionalized did not have x-rays which would often have showed the marked changes in the bone that must have been present for some time.

Dr. Kalinowsky, we did not have any midbrain lesions in this series. I have seen quite a few patients with midbrain tumors, and do not recall any that became psychotic or were treated as such. Of course von Economo pointed out that psychotic syndromes often occurred in patients with midbrain lesions as the result of encephalitis lethargica.

DR. JAMES W. CORRELL: In these patients who were operated upon there was a definite improvement in the mental condition. For long term postoperative evaluation, we can rely on the analysis of only six of the patients, five with meningiomas, and one with an oligodendroglioma, who have been followed for as long as seven years, and in all of these patients definite improvement occurred.

In regard to psychoses after operation, I know we have had a few, but this is not a statistical analysis of all brain tumor patients, so that we cannot answer the question as to how many patients developed psychoses following operation.

THE NEW YORK ACADEMY OF MEDICINE, SECTION ON NEUROLOGY AND PSYCHIATRY, AND THE NEW YORK NEUROLOGICAL SOCIETY

Joint Meeting, December 13, 1955

Joseph W. Owen, M.D., Chairman, Section on Neurology and Psychiatry, Presiding

A CONTROLLED STUDY OF RESERPINE IN THE TREATMENT OF MENTAL ILLNESS. DR. LUCILE M. WARE AND DR. CURTIS T. PROUT. N. Y.

Fifty patients, ranging in age from 15 to 78 years, were treated at the New York Hospital-Westchester Division with Serpasil in a double-blind study to compare its effectiveness with identical courses of placebo. The medication was administered according to a planned schedule and observations were made using a standard rating scale. The placebo disguise was considered effective.

The drug was employed in three dosage schedules: 1) Low dose: 3.5 mg. intramuscularly followed by daily oral administration of 1.5 mg. 2) Moderate dose: 5 to 10 mg. orally daily for first week, 5 mg. for second week, and 2.5 to 5 mg. orally for duration of treatment. 3) High dose: 5 mg. twice daily intramuscularly augmented by 5 additional mg. daily to maximum of 30 mg. Fifteen mg. orally was then substituted for the intramuscular injections and the dosage gradually reduced to 5 to 10 mg. orally, daily.

Noted side effects ranged from flushing of the face to a marked lassitude and a Parkinson-like syndrome. Hypotension and bradycardia was a constant side effect. The severity of the side effects was in direct ratio to the size of the dosage, while psychological benefit was not dependent on the size of the dose. The suggested effective therapeutic range, with minimal side effects, lay between 2 and 10 mg. orally.

In this study there was significant benefit to schizophrenic patients, particularly in the catatonic group. The manic-depressive circular group was helped in the manic phase but not in the depressive phase. Half the patients with agitated depressions received benefit, but only while on the medication. Transient improvement was noted in the psychoneurotic group. The elderly group became more manageable but prone to stasis problems and side effects. Serpasil was not regarded as a cure but an another valuable addition to the armamentarium of the psychiatrist in making

the patient more amenable to psychotherapy and program therapies.

Discussion.—Dr. Jack London: I would like to ask whether the drug compares with chloropromazine, and how you compared the two.

Dr. Peter G. Denker: Did you notice any increase in depressions at the times when you used reserpine?

Dr. Lawrence H. Gahagan: I would like to point out that reserpine will produce depressions, and in line with Dr. Denker's question, it is hard to see how this drug could possibly be used in the treatment of depression. There are three articles in the October 29th issue of the J. A. M. A. all of which report that reserpine causes depression in a significant number of patients.

Dr. William Offenkrantz: I would like to inquire whether any effort was made to evaluate the role of the "adjunctive therapy" that was continued during the course of reserpine, namely, psychotherapy, when used either with the placebo or with the medication itself.

Dr. Curtis T. Prout: Did I understand the first question as to how reserpine compared with chloropromazine? We did not run a control with chloropromazine, but at the same time we are using chloropromazine. In general I feel that chloropromazine has perhaps been somewhat more effective. The difference is essentially in the fact that the side-effects are reversible with Serpasil, and when you have an anxiety, or such a condition as was indicated in the report as catatonic schizophrenia in which it operates, we would prefer to use Serpasil. We have a planned laboratory study in conjunction with the use of chloropromazine which is keeping our side-effects and poor reactions from it down.

With regard to adjunctive therapy associated with treatment, we do feel that the patients we placed on chloropromazine following electroshock have a tendency to maintain the benefits of the electroshock better than they would with either electroshock alone or chloropromazine alone.

In respect to a comparison of whether psychotherapy is more effective, I do think that the drug opens the patient somewhat more to psychotherapy, and in our subsequent results we feel that we gained a great deal in time and the ability to approach the patient.

In the matter of the occurrence of depressions, we did not see depressions as such the result of our use of reserpine,—we did see, however, a marked lassitude, but the reaction was not that of a depression in the studied series. I know articles have been published on depressive reactions to reserpine, but it just happens we did not see them. I think that is a very strong potential, and one must be on the alert for depressions. Some of the patients in the published reports have gone on to suicide following a depressed reaction with the use of Serpasil.

Psychopathology of the Masochistic Character: Illustrative Cases. Dr. Charles Brenner.

The masochistic character has a variety of unconscious determinants, of which several will be present in any one case. However, the particular ones which are present and their relative importance will vary from case to case. The following unconscious determinants and mechanisms are important in the formation and structure of masochistic character structure: 1) turning of aggression or rage against the self; 2) passive or feminine sexual gratification; 3) reaction formation against aggressive or sadistic wishes; 4) self-punishment; 5) propitiation of and seeking love from a parent; 6) identification; 7) projection; 8) magical control of the environment. These mechanisms are illustrated by two case presentations.

Discussion.—Dr. Norbert Bromberg: I enjoyed Dr. Brenner's discussion of this highly complicated problem very much. Apparently there is a renewed awareness of the importance of this problem. Perhaps it is due to the greater incidence with which it is being observed. As in every other medical problem with a greater degree of observed frequency, the question always arises as to whether this is due to the more refined methods of detection, of diagnosis, or whether there is an actual increase of incidence because of changes in causative factors in the community. I am inclined to feel that probably both factors play a role here.

With regard to the etiology, very little has been written on this subject. Dr. Brenner's paper has covered some of the ideas that have been put forward, as well as his own, on the subject.

Dr. Sidney Klein: Dr. Brenner referred to an aspect of masochism which gives the sufferer a feeling of great strength. Here we seen an expression of it as a cultural phenomenon. However, as Dr. Brenner shows, the patients are people who need one's help with this pathological masochism. A degree of masochism does contribute to one of the excellent bits of sublimation we hunger for in every-day life in a civilized society.

Dr. Peter Denker: It is always significant to me, when I hear these lengthy, theoretical psychoanalytic explanations, as to what is omitted. Despite the verbose description of "mechanisms", and two to three years of analysis, not a word was said about the progress or prognosis in these cases. I would like to know what clinical results are achieved in your expert hands by this prolonged treatment.

Dr. Leo L. Orenstein: Dr. Brenner limited his discussion, and I think wisely so, to prolonged treatment cases. Most of us, including Dr. Brenner, have at some time treated patients at clinics. Here we see the patient infrequently as compared with established analytic practice. Yet, and this may bear on Dr. Denker's question, when we see people with masochistic character we are able to help a number of them gain better health.

My own experience at two hospitals includes the treatment of a number of patients of the type Dr. Brenner described. So long as these patients are shifted from one clinic to another, their medications changed from visit to visit, their plaintiveness ignored, or frequently not correctly evaluated, they will not improve at all. It has been my experience that these people can be helped by pointing out the masochistic drives rather than experimenting with a different prescription

each visit. In fact, one can safely apply what might be called "cold turkey" treatment as far as medication goes with such patients.

DR. CHARLES BRENNER: I want to thank the discussants for their remarks and questions. Dr. Denker asked about prognosis. These are very difficult cases to treat, and I certainly do not have a large enough series to be able to give a statistic that means anything. I would say it is possible in some cases, and I think it was so in those cases I presented, to produce substantial improvement in the severity of the clinical symptoms.

TISSUE AND SERUM ALDOLASE IN NEUROMUSCULAR DISEASE. DR. STANLEY M. ARONSON AND DR. BRUNO W. VOLK.

The serum aldolase test was applied to 250 patients with a wide variety of neuromuscular disorders. In 29 cases of progressive muscular dystrophy, the serum aldolase level was invariably elevated. The magnitude of this increase was most pronounced in children, the degree of elevation diminishing progressively in older patients with the disease. Contrariwise, tissue aldolase levels, in cases of muscular dystrophy, were significantly depressed. In nuclear myelopathies (progressive degenerative diseases involving the spinal anterior horn cells) a moderate hyperaldolasemia was apparent. Patients falling in the category of upper motor neuron lesions (vascular hemiplegias), diffuse cerebral degenerative disease (e.g., Schilder's disease, multiple sclerosis), or wasting infirmity of non-neurologic origin (e.g., incapacitating arthritis) invariably displayed normal or subnormal serum aldolase values, in spite of evident muscular atrophy.

In experiments performed on dogs, a slightly belated but significant rise in serum aldolase was recorded following femoral neurotomy. Muscular atrophy induced by tenotomy, with preservation of nerve supply, however, was not attended by any rise in the serum aldolase.

From the limited clinical and experimental data it would appear that elevation of serum aldolase occurs preeminently in promary progressive myopathy and to a lesser extent in those forms of muscular atrophy consequent to functional severance of the lower motor neuron complex.

Discussion.—DR. LEWIS P. ROWLAND: This presentation by Drs. Aronson and Volk has been of considerable encouragement to us at Montefiore Hospital. We have been measuring serum aldolase in the laboratory of Mr. George Ross and were disappointed to find that we could not confirm the results of Dreyfus and the Schapiras, who originally introduced this as a diagnostic test for muscular dystrophy (*Sem. Hop. Par. 29:* 1917, 1953; *Am. J. Phys. Med. 35:* 313–319, 1955).

None in our group of patients with myopathic disorders (progressive muscular dystrophy, myotonic dystrophy, and miscellaneous myopathies) have had significant elevations of serum aldolase as compared with a control group (normals and patients with seizures, headache, or myasthenia gravis) or with a group of patients with other wasting diseases (neural, nutritional and malignant).

Our series is still quite small and we are not yet ready to make any definite conclusions. We did suspect that one possible reason for the discrepancy between our findings and those of the French workers might lie in the selection of patients. Many of their myopathic patients with hyperaldolasemia were children, whereas all of our patients have been adults, some surviving a disease process which had started in childhood, others with myopathies of more recent onset. Therefore our patients constitute a heterogeneous group as far as tempo and duration of the disease process are concerned.

The work of Drs. Aronson and Volk may provide the link between these two apparently disparate findings. For they have confirmed Dreyfus and Schapira in finding the elevation of aldolase in children with myopathies, while their adults with myopathies, like ours, had values more nearly normal. I should like to ask Drs. Aronson and Volk how their normal values were established and whether there were any differences between normal children and adults. I was impressed with the large number of patients in the myopathic group over 30 years old; were these all survivors of childhood dystrophy, or were some of them of recent onset and still in an active stage of evolution? Was there any difference in the aldolase values for the different kinds of dystrophy and myopathy? If so, did this parallel the degree of wasting? Finally, was there any trend in the values of patients who were followed with repeated determinations which might suggest that hyperaldolasemia is a measure of activity?

DR. THOMAS K. DAVIS: Dr. Aronson has mentioned six categories. He has gone from cases in which the lesions are in the muscle tissue—mention has been made of experimental investigations of peripheral nerve lesions in dogs—and he has reported findings in the cases where the lesions are in the spinal cord. But what about cases in which the sympathetic nervous system plays a main role?

Benisty, at the period of the First World War, described the condition known as a Reflex Nerve Disorder. It does not rest upon an injury to a peripheral nerve. Instead it follows an injury to a part—most usually an arm—and the physiological changes which arise distally evolve through the sympathetic system. True enough the degree of muscle atrophy—in which Dr. Aronson is interested—is in these cases relatively minor, but it is there. Also the reflex nerve disorder case is indeed rare in civilian life.

I would suggest that the authors include such cases if they can come across them. This would fill, what I consider, a small gap in their study.

DR. STANLEY M. ARONSON: Our normal values of serum aldolase were based upon specimens derived from about 50 healthy individuals, laboratory technicians, students and a number of hospitalized patients with non-incapacitating, generally transient diseases. Our normal level of 7.14 units per milliliter was in substantial agreement with those determined in other laboratories. No significant differences in serum aldolase values between children and adults were evident.

Most of our patients have come from the National

Foundation for Muscular Dystrophy and the wards of the Jewish Chronic Disease Hospital and Kings County Hospital Center. The diagnosis was generally established on the basis of biopsy examination and clinical evaluation. The ages, in the muscular dystrophy group, ranged from 4 to 55 years, the majority within the first two decades of life. No myotonic dystrophies were included in this series.

Some trends were apparent in patients tested consecutively with this procedure. In 3 young boys with muscular dystrophy aldolase levels were obtained at about monthly intervals. The values tended to diminish slightly in a study period of about 9 months, in accordance with the decline previously described. In a group of children afflicted with Tay Sachs' disease, serial determinations were also carried out. There is progressive anterior horn cell involvement as a component feature of this disease. The serum aldolase levels tend to rise during the first 18 months of the disease, coinciding with the progressive limb flaccidity and atrophy, and then diminish.

In answer to the query concerning aldolase levels in cases of peripheral neuropathies, we regret that our results for this category are insufficient, because of limited patient material.

COMPLICATIONS OF CEREBRAL ARTERIOGRAPHY IN 220 CASES. D. D. R. CODDON AND DR. H. P. KRIEGER.

Carotid arteriography provides unique information, but may be attended by complications. In this study, complication is defined as any detrimental change occurring in the first 24 hours after arteriography; the over-all rate of complications was 14 per cent, of these less than 2 per cent were permanent. There were no deaths. Factors associated with complications were: 1) intravenous anesthesia; 2) multiple carotid injections; 3) progression of neurological signs; 4) depressed level of consciousness; 5) age over 50; 6) presence of tumor or aneurysm, the latter having the greater rate of complication. No single factor served to predict complications in a given patient. In this series the diagnostic information obtained outweighed the risk of complications.

Discussion.—DR. JACK LONDON: Have you ever performed angiography in pregnant women, and if so, have you had any deleterious effect, as far as you know?

DR. JOSEPH STEIN: Can you tell us more about the group which had the intravenous barbiturate anesthesia? Is this group in any way different in their general condition or etiology from the others?

DR. DAVID R. CODDON: In answer to Dr. London's question, we did not have any pregnant patients in whom the procedure was carried out.

In reply to Dr. Stein's question concerning the use of intravenous barbiturate anesthesia, it was most often used for emotional and psychological reasons. That is, anesthesia was used in patients who were either extremely anxious or restless, or where the family situation was such that anesthesia was required to placate the relatives.

BOOK NOTES AND REVIEWS

Books received are acknowledged and given a brief description in this section. Selections serving a variety of interests will be made from these for a more extensive review, as far as space will allow.

BOOK NOTES

Holmes, Gordon: THE NATIONAL HOSPITAL: QUEEN SQUARE 1860–1948. [Edinburgh and London: E. S. Livingstone; Baltimore: Williams and Wilkins, pp. 98, Illustrated, 1954, $3.00.]

With this book we come into possession of a most valuable document for which neurology in indebted to the scholarship and talent of an outstanding member of the specialty. Dr. Holmes has packed a remarkable amount of historical information in a limited space and has illustrated it with eight fine plates of the famous staff members of Queen Square including the portraits of Hughlings Jackson, David Ferrier, James Collier, Victor Horsley and views of the hospital at different stages of its development.

There are brief biographies of the eminent physicians connected with the hospital over the years, many of whom taught our predecessors and of course, many of our contemporaries. Here in America as elsewhere it has always been considered a great privilege to have the opportunity to study at the National Hospital.

There is an appendix listing chronologically the honorary medical and surgical staff members from 1859 to 1948, with the date of appointment, the post held and the time of resignation and deaths. The Registrars of the National Hospital for the Paralyzed and Epileptic and the Pathologists as well as the Deans of the Medical School are also listed.

The story reveals how this institution through its eighty eight years developed from an eight bed unit in an old house into one of the most modern independent hospitals in the world with accommodations for about two hundred patients, an active out patient department and splendid teaching facilities. In the words of the author "Its clinical reputation and its fame as a center of scientific medicine were created by the work of its unpaid professional staff, many of whom in its early days, at least, acquired distinction in other branches of medicine too. Its roll contains the names of fourteen who received the honor of baronetcy or knighthood, twelve were Fellows of the Royal Society, two had become President of the Royal College of Physicians and one of the Royal College of Surgeons."

The book should enrich many private libraries and give readers in neurology a great deal of pleasure.

Grinker, R. R. and Robbins, F. P.: PSYCHOSOMATIC CASE BOOK. [New York: The Blakiston Co., Inc., p. 346, 1954, $6.50.]

The reader is introduced to the basic principles of psychosomatic medicine through the presentation of 79 clinical histories dealing with a wide range of patients affected with various disorders. It is an attempt at a psychosomatic approach to medicine with discussion of basic principles rather than a delineation of "psychosomatics" as a specialty branch of medicine. Actually there is no such specialty as psychosomatic medicine. However, the old terms "psyche" and "soma" find their way, or are implied, in this text as well as in all others on the subject.

The subject matter is presented in five parts. In the first part there are five chapters devoted to general considerations introducing the different aspects of the field covered. The second part, with three chapters, presents the methods of examination, differential diagnosis and the formulation of case problems. The third part consists of eight chapters on the syndromes according to bodily systems. The fourth part contains three chapters on therapy, including planning methods and doctor-patient relationship. The last part has a com-

prehensive summary, a bibliography and an index.

The specialist in psychiatry will find little that is new or startling either in theory or practice but the general practitioner and students will gain a considerable knowledge and a wholesome attitude from the illustrative cases and from the interrelationships indicated. A great deal of "psychosomatic medicine" is still based on interpretations and speculations not yet susceptible to accepted scientific proof, but in the meantime one must work with the implications available.

Darwin, Charles: THE EXPRESSION OF THE EMOTIONS IN MAN AND ANIMALS. [New York: Philosophical Library, Pp. 372 + viii additional plates, 1955, $6.00.]

It is with a great deal of satisfaction that we note the revival of this classical work in the form of a new edition. Too many of the younger generation of biologists and psychobiologists have never read the book and unfortunately some seem never to have known of its existence in the original.

Darwin was a genius in the true sense of the word, which is now too often used to indicate talent rather than the creation of original ideas. Darwin studied infants, the psychotic, paintings, sculpture, comparative anatomy of the emotions and some of the animals for the expression of feelings in a unique way that few have equaled since, and perhaps none surpassed. The translation of some of Darwin's descriptive terms into those of cybernetics or other modern usage does not seem to help much in the understanding of the basic mechanisms of behavior.

The editor (Dr. Margaret Mead) of this new edition has amplified the book by adding at the end some samples of recent research which is in keeping with the Darwinian attitude. These include interesting photographic studies of the Balinese by Gregory Bateson, drawings of expressive behavior of some animals by Konrad Lorenze and photographs of some of the speakers on culture and communication at Louisville University, a group of workers concerned with the development of a new science called "kinesics".

The book is still after many years extremely interesting from literary, historical and scientific points of view.

Freud, Sigmund: THE ORIGINS OF PSYCHO-ANALYSIS: LETTERS TO WILHELM FLIESS: DRAFTS AND NOTES 1887–1902 (Edited by Marie Bonaparte, Anna Freud and Ernst Kris. Translation by Eric Mosbacher and James Strachey). [New York: Basic Books, Inc., pp. 486, 1954, $6.75.]

Psychoanalysts and others interested in the early origin and development of the psychoanalytic concepts will feel well rewarded after reading this volume which presents a large number of letters written by Freud to his close friend, the Berlin physician Wilhelm Fliess. These letters were sent to Fliess between the years 1887–1902 and came into the hands of the Editors from a second hand dealer. The whereabouts of Fliess' replies are not known at the present time.

The editors have made a useful selection of material from a correspondence consisting of 284 items. "The selection was made in the principle of making public everything relating to the writers scientific work and scientific interests and everything bearing on the social and political conditions in which psychoanalysis originated, and of omitting or abbreviating everything, publication of which would be inconsistent with professional or personal confidence."

These 168 letters are introduced by a comprehensive article by Ernst Kris which serves as orientation and explains also the scientific interests of Fliess and Freud's early interests in psychology, physiology, infantile sexuality, and self-analysis. About 100 final pages of the text are devoted to a manuscript entitled "Project for a Scientific Psychology", dating from the autumn of 1895. It is presented in four parts and clearly demonstrates the trend of Freud's thoughts at that itme.

There are two very useful and informative bibliographies. One of the writings of Freud referred to in this book and the other an index of other authors. The general index is adequate. It is an outstanding contribution to the history of psychodynamics that should invite a wide reading.

Goldfarb, William and Dorsen, Marilyn M.: ANNOTATED BIBLIOGRAPHY OF CHILDHOOD SCHIZOPHRENIA AND RELATED DISORDERS AS REPORTED IN THE ENGLISH LANGUAGE THROUGH 1954. [New York: Basic Books, Inc., 1956. Pp. vi + 170. $2.50.]

Dr. Goldfarb, director of the Henry Ittleson Center for Child Research, a division of the Jewish Board of Guardians in New York, and his collaborator, Miss Dorsen, research fellow, published in this small-size, paper bound booklet, titles of articles and books on childhood schizophrenia and related serious mental disorders in childhood. The authors made an attempt to survey the literature as completely as possible. The annotations, most of them from 30 to 50 words in length, summarize only that aspect of each study which is relevant to the problem of childhood psychosis. Individual case studies as well as group studies, clinical psychiatric, psychological test, and social work investigations are included. This bibliography is the result of great labor. Of the great mass of material read, over 1000 articles were abstracted but only 584 were finally selected because these were specifically concerned with childhood schizophrenia and similar psychotic conditions. Anyone interested in childhood psychoses will want to have this bibliography which will probably become indispensable as a research aid. An index would have enhanced the value of this useful bibliography.